

# **University-Industry Cooperation at the Regional Level: The Case of Saxony**

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## **State-of-the-Art Report**

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## 1 Background and objective of study

### 1.1 University-industry cooperation in regional sciences

For some years, there has been broad consensus within regional science that the competitiveness of a region largely depends on its innovative ability. Innovations in turn are the result of collective learning processes. Innovative regions thus are characterised by intensive cooperation between regional actors.

ASHEIM and ISAKSEN (2000) emphasise the importance of knowledge transfer in regional innovation networks: the exchange between private and public actors is fundamental for the coming off of innovations. The competitiveness of a region to a great extent depends on the ability to create “new” knowledge. In this regard, universities as well as research and development (R&D) institutions play an important role.

According to FRITSCH (2000) universities play different roles in innovation processes: firstly, universities are conducting research that is basic research, particularly in areas which are not covered by private R&D institutions; secondly, universities provide a knowledge reservoir that they are accumulating by own research or by contacts to other private and public institutions, and that they are bringing in cooperations with companies or R&D institutions; thirdly, universities are educational institutions, which is an important aspect in transfer activities. FRITSCH and SCHWIRTEN describe the function of public research institutions as an “aerial”: they are “absorbing knowledge from research institutions and firms in other regions and [are] making it available to innovation processes in their region” (FRITSCH, SCHWIRTEN 1999: 81).

The innovative milieu approach (CAMAGNI 1991; MAILLAT 1991, 1998) emphasises the importance of the region’s socio-culture as a basis for the emergence of trust-based cooperation and networks. Intra-regional cooperation and the socio-cultural “embeddedness” (GRANOVETTER) are decisive for the generation of innovations. Beyond that, “learning regions” (MORGAN 1997) and “regional innovation systems” (BRACZYK, COOKE, HEIDENREICH 1998) approaches point up that geographic proximity may promote collective learning processes and knowledge transfer, particularly with regard to geographically immobile “tacit knowledge”. Geographic proximity thus is believed to reduce uncertainty and to guarantee access to innovation inputs.

The Lisbon strategy of the EU Commission aims at converting Europe into the most advanced knowledge economy in the world until the year 2010, for which the creation of a unique space for innovation, education and research has been considered, and an ambitious entrepreneurial development programme has been launched. All these challenges carry a major one for universities and university-industry collaboration, particularly at the regional level.

Against this background the RUISNET project aims at stimulating university-industry cooperation in the regions of the project partners. In all partner regions university-industry cooperation already takes place. It is the aim of RUISNET to identify good examples of university-industry cooperation on the one hand. At the same time barriers and limitations for further cooperation shall be described on the other hand.

## 1.2 Objective of study and methodical approach

The purpose of this study is to analyse and to describe the regional dimension of university-industry cooperation in Saxony (Germany). The overall goal of the RUISNET project is to identify good examples of university-industry cooperation in the participating European regions. In addition to this the state-of-the-art report tries to analyse the regional impacts of these cooperations.

Analysing regional impacts of university-industry cooperation nevertheless is a big challenge. Generally, it is one of the great problems in regional science to link regional development (e.g. creation of new jobs, decrease of unemployment rate) directly to programmes or measures. It is not possible to say, if the described effects really can be traced back to a certain programme or measure, or if there are other reasons responsible for it. And it is even not possible to say, what would have happened without this programme or measure. Therefore this study will focus on the effects described in programme documents, and will not try to link general statistical data to certain programmes.

A first search for university-industry cooperation in Saxony showed a large variety of initiatives, programmes etc. Due to the great amount it is not possible to describe all programmes, initiatives etc. in the frame of this report. The study therefore focuses on the most promising examples. At the same time the described examples shall give a review of the spectrum of university-industry cooperation in Saxony. Finally, the availability of information about and results of the initiatives was an important factor. This should be taken into account, when reading this report.

Because of the limited time for accomplishing this study a pragmatic way was chosen. This means that the study refers on existing documents like studies, reports, documentation etc., which was supplemented by an internet based search for additional information and direct information from involved actors.

Finally, the character of this report should be emphasised. The report at hand is the first of two reports of this kind. Therefore it is this study's purpose to give a review of the regional dimension of university-industry cooperation in Saxony. It will be the task of the second report to have a more detailed look at some specific aspects of the presented results of this study.

## 2 University-industry cooperation in Saxony

Saxony has a long industrial tradition: it was one of the “cradles” of industrialisation in Germany in the 19<sup>th</sup> century and it remained an important industrial centre during socialist times. The change to a market economy which was brought about by German reunification in 1990 initially led to the widespread collapse of existing economic structures. Companies failed en masse, which resulted in widespread unemployment. Business had to undergo a process of fundamental structural transformation. Of course, reunification also brought economic opportunity: Saxony is quite successful compared with other regions in eastern Germany.

Saxony’s economic success was in the past and is today connected with science and research. Saxony hosts some of the oldest universities in Germany, e.g. TU Bergakademie Freiberg, Germany’s oldest technical university. Traditionally, they have close connections to the regional economy.

Over the last 15 years, scientific research as well as Saxony’s economy, underwent a profound restructuring. Today, scientific research is taking place in different institutions: in universities as well as in public or private research institutions. Beyond that, science and economy show a regional specialisation that has to be taken into account when analysing university-industry cooperation.

Science and research are important cornerstones for the (economic) development of the Free State of Saxony. The backbones of scientific research in Saxony are five universities and five universities of applied sciences in seven cities (see Fig. 1).

Fig. 1: Places of Higher Education in Saxony



Source: <http://www.smwk.sachsen.de/de/bw/studieren/1186.htm> (15.11.2005)

Close connections between university and industry have survived the profound changes of the last years. In this chapter, university-industry cooperation in Saxony will be described. It starts with a description of the most important actors, followed by the fields of interest of university-industry cooperation as well as instruments and strategies for promoting cooperation. The chapter ends with a closer look at the role of public programmes.

## **2.1 Actors of the university-industry cooperation**

University-industry cooperation is based on actors. The main actors are universities and research facilities on the one side and the regional industry – represented by enterprises industrial associations (chambers of industry and commerce, chambers of handicrafts, entrepreneur associations) – on the other side. Beyond that, technology transfer facilities play an important role of „mediator“ to promote the creation of durability of cooperations. Finally, federal and state authorities (particularly ministries) have an influence in establishing the framework of university-industry cooperations, for example, in form of laws, programmes, promotions, etc.

This chapter deals exclusively with the main actors, i.e. universities and research facilities, as well as the regional industry – the roles and responsibilities of transfer facilities and ministries are portrayed in connection with individual programmes and instruments in subsequent chapters.

### **2.1.1 Universities and research facilities**

Universities and research facilities have an „aerial“ function (see above) in regional innovation processes: as partners in regional networks, on the one hand, they provide knowledge for learning and innovation processes, while on the other hand, they support the know-how transfer between participating partners.

In the following, the most important universities and research facilities in the Free State of Saxony, as well as their potential for cooperation with the industry, are portrayed. The descriptions focus on the research profiles of facilities, since these may be viewed as connecting links for cooperations with the industry. Since cooperations are, first of all, aligned with the regional industry, they are presented region by region.

#### **Region Dresden**

The region of Dresden, consisting of the capital city of Dresden and surrounding cities and municipalities, in a quantitative as well as a qualitative respect, is the scientific centre of Saxony and beyond. There are ten universities in Dresden with a total of almost 39,000 students, making Dresden, second only to Berlin (16 universities, 140,000 students) the second most important university site of eastern Germany (REGIONOMICA 2005: 132).

Fig. 2: Important scientific and research facilities in the region of Dresden

- Technical University Dresden
- Hochschule für Technik und Wirtschaft Dresden (FH) (*technical college*)
- Fraunhofer Anwendungszentrum für Verarbeitungsmaschinen und Verpackungstechnik AVV des Fraunhofer Instituts für Verfahrenstechnik und Verpackung ICC (*application centre for processing and packaging technology*)
- Fraunhofer-Institut für Elektronenstrahl- und Plasmatechnik FEP (*electron beam and plasma technology*)
- Fraunhofer-Institut für Fertigungstechnik und Angewandte Materialforschung IFAM Außenstelle für Pulvermetallurgie und Verbundwerkstoffe EPW (*institute for production technology and applied material research*)
- Fraunhofer-Institut für Informations- und Datenverarbeitung IITB – Teilinstitut für Verkehrs- und Infrastruktursysteme IITB-IVI (*institute for information and data processing*)
- Fraunhofer-Institut für Keramische Technologien und Sinterwerkstoffe IKTS (*ceramic technology and sintered materials*)
- Fraunhofer-Institut für Mikroelektronische Schaltungen und Systeme IMS (*microelectronic circuits and systems*)
- Fraunhofer-Institut für Werkstoff- und Strahltechnik IWS (*materials and beam technology*)
- Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren IZFP Außenstelle für Akustische Diagnose und Qualitätssicherung EADQ (*institute for non-destructive test methods*)
- Institute for Polymer Research, Dresden
- Leibniz-Institut für Festkörper- und Werkstoffforschung, Dresden (*institute for solids and material research*)
- Leibniz-Institut für ökologische Raumentwicklung, Dresden (*ecological development*)
- Research Centre Rossendorf, Dresden
- Max-Planck-Institut für chemische Physik fester Stoffe (*institute for chemical physics of solids*)
- Max-Planck-Institut für molekulare Zellbiologie und Genetik (*institute for molecular cell biology and genetics, being established*)
- Max-Planck-Institut für Physik komplexer Systeme (*institute for physics of complex systems*)

Source: REGIONOMICA 2005: 132-144

The **Technical University Dresden** (TU Dresden), with almost 35,000 students and nearly 4,000 employees is the largest university of Saxony. After the fall of communism in 1989/90, it was expanded into a „full university“ with a wide range of faculties, even though natural science and engineering faculties continue to dominate. In recent years, many public, semi-public and private research facilities have been created in the catchment area of the TU Dresden. The number of scientific facilities in the region of Dresden (see Fig. 2) offers a great potential for cooperations with the industry.

Particularly the TU Dresden contributes to this goal with its research profile, which is characterised by the following focal points:

- Material sciences, biomedicine / biomaterials, molecular and medical materials, nanotechnology,
- Information system technology,
- Population, infrastructure and traffic,

- Water, energy, environment.<sup>1</sup>

The research profile outlines show a high level of concurrence with the regional structure of industrial branches, which is the reason why the TU Dresden is involved in numerous cooperations with the industry. On account of the sustained concentration of the semiconductor industry in the region of Dresden („*Silicon Saxony*“), particularly the branches of electrical engineering, electronics and information technology are of outstanding importance in the provision of qualified graduates (REGIONOMICA 2005: 135).

An important indicator for the application orientation of research performances is contract research, which is expressed by the acquisition of funds from third parties. In the year 2003, the TU Dresden for the first time attracted more than € 100 million of funding by third parties; in 2004 this had grown to € 108 million. The funds mainly come from public funding, in particular the Federal Ministry of Research, the Deutsche Forschungsgemeinschaft (DFG) and the European Union. In addition to that, sponsoring funds from the industry are gaining increasing importance.

The close contacts between enterprises, professors and students are an important prerequisite for the development of cooperations, without which the numerous successful settlements of business enterprises in Dresden in recent years would have been unthinkable, for example, the settlement of enterprises like Infineon, AMD and Volkswagen as well as numerous suppliers and service providers.

The **TU Dresden Aktiengesellschaft** (TUDAG) was founded in 2000 by the Gesellschaft der Freunde und Förderer der TU Dresden e.V. As a group of companies close to the university, its responsibility is to support the transfer of knowledge from research and education to the commercial marketplace.<sup>2</sup>

### Region Leipzig

A study by the Institut für Wirtschaftsforschung (IWH) Halle has found that the city of Leipzig is exceptionally well positioned in extra-university research. Numerous new research facilities have been started in Leipzig in recent years. One of the latest start-ups is the Fraunhofer-Institut für Zelltherapie und Immunologie (IZI). The Max-Planck-Gesellschaft has significantly expanded its Institute for Psychology in Leipzig by the relocation of capacities from Munich.

Leipzig, with seven universities and 36,000 students, is the third largest university site in eastern Germany. Important universities are:

- University Leipzig,
- Hochschule für Technik, Wirtschaft und Kultur (HTWK) (*College for Technology, Business and Culture*),
- Hochschule für Grafik und Buchkunst (*Academy of Visual Arts*),
- Hochschule für Musik und Theater (*University of Music and Theatre*),
- Fachhochschule der Deutschen Telekom (*Advanced Technical College of Deutsche Telekom*),

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<sup>1</sup> <http://tu-dresden.de/forschung> (15.12.2005)

<sup>2</sup> [www.tudag.de](http://www.tudag.de) (15.12.2005)

- Handelshochschule (*Commercial College*) Leipzig.

In addition to that, Leipzig is the seat of the Sächsische Akademie der Wissenschaften (*Saxon Academy of Sciences*) and the Umweltforschungszentrum (*Environment Research Centre*) Leipzig-Halle GmbH (UFC), three Max-Planck Institutes (*Max Planck Institute for Cognitive and Neuro Sciences, Max Planck Institute for Mathematics in Natural Sciences, Max Planck Institute for Evolutionary Anthropology*) as well as three institutes of the Leibniz-Gemeinschaft (*Leibniz Institute for Geography, Leibniz Institute for Troposphere Research, Leibniz Institute for Surface Modification*).

The arts dominate at **University Leipzig**. In contrast to other Saxon universities in Chemnitz, Dresden and Freiberg, there is no engineering education available at the University Leipzig. This may be viewed as a disadvantage in relation to the formation of cooperations with the industry. For that reason, the University Leipzig is concentrating to a large extent on basic research.

Triggered by the BMBF initiative „Top Universities for Germany – Initiative for Excellence in Competition“ the University Leipzig began realigning its research profile in the year 2002. At the „Leipzig Research Summit“ in February 2004, these five new competence fields were introduced:

- from micro to nanostructures: applications in chemistry and physics,
- mathematics and exact natural sciences,
- molecular and cellular communication, growth and differentiation: biomedicine, biotechnology and bioinformation technology,
- from molecule to behaviour,
- new spaces for social and cultural processes.

At the introduction of the competence fields, it was emphasized by the complete scientific excellence at the University Leipzig cannot be described in five clusters. Rather, these are supplemented by the scientific variety of many smaller, international outstanding disciplines for which the University Leipzig is famous, above all, in the arts and social sciences (UNIVERSITY LEIPZIG 2004: 15).

### **Region Chemnitz-Zwickau**

The region of Chemnitz-Zwickau has traditionally been characterized by the textile industry – manufacturing of textiles as well as textile machine building. On account of growing global competition and the structural change the industry has been experiencing in recent years, the textile industry in the region of Chemnitz-Zwickau is betting on new technical textiles as well as textile research. Other important regional industrial branches are automobile engineering, machine building, the building trade and electronics.

The **Technical University Chemnitz** (TU Chemnitz) is characterized by its technical and engineering science alignment, which allow close connections to the regional industry. There are numerous partnerships and cooperations between the university and local businesses. The merger of technology and social sciences is also known as the „Chemnitz Model“.

The TU Chemnitz has compiled a future-oriented development concept, which builds on strengths and is designed to create an unmistakable profile. At its core is the inter-faculty

reinforcement of research structures. Six research profiles are an expression of university-based research:

- new materials,
- holistic production,
- microelectronics and microsystem technology,
- customer-oriented design of networked value creation chains,
- communication, media, technology,
- modelling, simulation, high-capacity computing.

Aside from the TU Chemnitz, there are only two more public research facilities of the Fraunhofer Society, the Fraunhofer Institut für Werkzeugmaschinen und Umformtechnik (IWU) (*Machine Tools and Metal Forming*) and the Fraunhofer Institut für Zuverlässigkeit und Mikrointegration (IZM) (*Reliability and Microintegration*). However, there are numerous private research facilities in the region of Chemnitz (enterprises or associations), which have been created out of former collective combines: among others, the Sächsisches Textilforschungsinstitut e.V. (STFI) (*Saxon Textile Research Institute*), the Cetex Chemnitzer Textilmaschinenentwicklung gGmbH (*Textile Machinery Engineering*) and the Elektrische Automatisierungs- und Antriebs-Technik EAAT GmbH (*Electrical Automation and Motive Power Technology*) (see also Ch. 2.1.2).

In addition, the TU Chemnitz also maintains close contacts with the universities in Freiberg and Zwickau. The **Westsächsische Hochschule in Zwickau** (*West Saxon College*) is a technical college with the main focus on technical courses of studies, electrical engineering and business.

The **TU Bergakademie Freiberg** (*Mining Academy*), with its 4,600 students, is the smallest of the technical universities in the Free State of Saxony. It was founded in 1765 and therefore is able to look back on a long scientific tradition.

The research profile of the TU Bergakademie Freiberg includes the following areas (TU BERGAKADEMIE FREIBERG 2004):

- raw materials exploration, extraction and resource economy,
- energy carriers and technology,
- development, creation and processing of material and building supplies, material refinement and utilization,
- electronic materials, sensorics and automation technology,
- materials and waste recycling, media circulation and cycle management,
- particle technology, mechanical and thermal process engineering,
- applied mathematics, stochastics and practical information technology,
- innovation research, economical transformation, project management.

## Region Lausitz

Finally, the fifth and youngest Saxon university to be mentioned here is the **Hochschule Zittau / Görlitz (FH) – University of Applied Sciences**. It was founded as recently as 1992. With 3,800 student, it is also the smallest Saxon university. The FH Zittau / Görlitz is characterized by offering a wide range of studies, comprising six fields of competence:

- information and communication,
- energy and systems engineering,
- applied life sciences,
- social transformation processes,
- building and infrastructure,
- entrepreneurial activities.

The FH Zittau / Görlitz is distinguished by its application-oriented research. With € 4 million of third party funds – according to their own statement - it was one the most successful advanced technical colleges in Germany.

Another indicator for its close relations to the regional industry is that the FH Zittau / Görlitz is participating in the networks Energy and Environment, Surface Technologies as well as Information and Communication within the scope of the InnoLausitz Initiative (see Excursus), in the process creating many new jobs. For instance, there were some business start-ups as spin-offs from university projects.

### **Excursus: InnoLausitz-Initiative**

The initiative „InnoLausitz“ is an initiative across federal state borders for the development of innovative SME networks, with the objective of preserving existing jobs and creating new jobs in the region. The initiative is based on the BMBF competition „InnoRegio“, which it had applied to participate in. While this was not successful, efforts nevertheless continued independently with the aid of other developmental funds of the federal and state governments. Aside from SME, other universities (e.g. FH Zittau-Görlitz), local authorities as well as further regional actors (chambers of industry and commerce, chamber of handicraft, economic development agencies) also participated.

Currently, InnoLausitz is connecting 15 industrial networks (clusters), which are located across state lines in the regions of Niederlausitz (Brandenburg) and Oberlausitz (Saxony).

The objectives of the networks are:

- cooperations in sales, procurement and service,
- research and development,
- innovative product developments,



Area served by „InnoLausitz“<sup>3</sup>

<sup>3</sup> [http://www.nwp.fh-lausitz.de/cgi-bin/innolausitz\\_top.pl?rubrik=12](http://www.nwp.fh-lausitz.de/cgi-bin/innolausitz_top.pl?rubrik=12) (18.12.2005)

- market introduction,
- Euro-regional cooperations,
- internal and external marketing,
- development of human resources, as well as
- inventory development.

Thus, the stated objectives match the main points of interest that have been identified for the entire state of Saxony as a whole.

The specific characteristics of InnoLausitz are<sup>4</sup>:

- the complexity due to inter-state cooperation between Saxony and Brandenburg (region Lausitz from Cottbus to Zittau),
- the association of all universities of the region and networking with SME and regional partners,
- development of regional competence in industrial branches,
- individual projects with high innovation levels and market relevance,
- innovative role model for the future of the region.

The strategy for the Lausitz consists, on the one hand, of strengthening the traditional industrial branches (e.g. energy technology, metal and electrical industry), and on the other hand, of establishing new branches, such as surface technology, aviation and space technology and biotechnology. This is being achieved by numerous implemented innovation forums as well as projects in the area of network management east, innovative growth cores, bioResponse, InnoRegio competitions.

It may be stated that in recent years the Saxon universities have been redefining their main focus of research. In all described cases, a concentration on selected main focal areas can be recognized. This may be attributable, among other reasons, to the increasing scarcity of public funds as well as growing competitive pressures between universities (also in a European context).

Further to that, the focal points of research indicate a relation to the regional industrial structure. This is an advantage, especially under the aspect of cooperating with the local industry, since cooperations may be achieved much easier in this way.

### 2.1.2 Regional economy

The existing public research infrastructure is supplemented by research potentials in the industry. In the year 2001, there were more than 10,100 employees in companies of all branches across Saxony who were responsible for research and development (R&D). The numerically largest research potentials were available in machine building, in the service provider industry, research and development, radio, television and communication technology as well as in the automobile industry. Two thirds of researchers are working in enterprises with less than 250 employees, which is mainly a consequence of the industrial structure of Saxony (see Ch. 2.2.2). Three quarters of organizations involved in research and development are maintaining, within the scope of their research activities, cooperative

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<sup>4</sup> <http://www.lausitz.de/Wirtschaft/de/Unternehmensnetzwerke.html> (18.12.2005)

relations to business enterprises, scientific facilities and other partners. Almost one third of the sales of enterprises engaged in R&D is achieved through exports (see EURONORM GMBH 2003).

The industrial infrastructure of Saxony consists of 33 external industrial research facilities, among them 13 non-profit and 20 commercial organizations usually in form of a limited company for research. These companies operate at the interface between basic research and industrial applications. With the support of the Saxon Ministry of Economy, these facilities have developed into competence centres, are R&D supporters and innovative enterprises for different industrial sectors. The most important facilities include

in the administrative district of Chemnitz:

- CETEX Chemnitzer Textilmaschinenentwicklung gGmbH (*textile machinery development*)
- Forschungsinstitut für Leder- und Kunststofftechnologie - FILK, Freiberg (*Research Institute for Leather and Plastic Technology*)
- CeWOTec Chemnitzer Werkstoff- und Oberflächentechnik gGmbH (*material and surface technology*)
- IBExU Institut für Sicherheitstechnik GmbH, An-Institut an der TU Bergakademie Freiberg (*safety engineering, subsidiary of mining academy*)
- ifm Institut für Musikinstrumentenbau Vogtländischer Förderverein für Musikinstrumentenbau und Innovation e.V. (*manufacture of musical instruments*)
- SLG mbH-Ingenieurtechnik, Chemnitz (*engineering*)
- stfi Sächsisches Textilforschungsinstitut e.V., Chemnitz (*textile research*)
- H&T Produktionstechnologie, Crimmitschau (*production technology*)
- Zentrum für Material- und Umwelttechnik GmbH, Gemeinnütziges Unternehmen im FNE Forschungsinstitut für Nichteisen-Metalle Freiberg (*material and environmental technology*)

in the administrative district of Dresden:

- FER-Mont Produktionssysteme GmbH, Dresden (*production systems*)
- Gesellschaft für Verpackungstechnik und -logistik mbH, Dresden (*packaging and logistics*)
- IBN GMBH Gesellschaft für industrielle Forschung und Entwicklung, Dresden (*industrial research and development*)
- IMA Dresden Materialforschung und Anwendungstechnik GmbH, Dresden (*material research and application technology*)
- Ingenieurbüro für Verpackung, Dresden (*packaging*)
- Institut für Holztechnologie Dresden gGmbH (*wood engineering*)
- Institut für Luft- und Kältechnik gGmbH, Dresden (*ventilation and refrigeration*)

- Institut für Medizintechnik Dresden im Förderverein IMT Dresden e.V., Radebeul (*medical technology*)
- KI Keramik-Institut GmbH, Meißen (*ceramics*)
- Papiertechnische Stiftung Institut für Zellstoff und Papier, Heidenau (*paper technology*)
- VAD Video-Audio-Design GmbH, Dresden
- Von Ardenne Anlagentechnik GmbH, Dresden (*systems engineering*)
- Von Ardenne Institut für Angewandte Medizinische Forschung GmbH, Dresden (*applied medical research*)

in the administrative district of Leipzig:

- Egenolf Prüftechnik Leipzig GmbH (*test engineering*)
- HFB Engineering GmbH, Leipzig
- IFF Engineering & Consulting GmbH, Leipzig
- IFG Institut für Gebirgsmechanik GmbH Untersuchung-Prüfung-Beratung-Begutachtung, Leipzig (*geology*)
- IGT emus GmbH Forschung Entwicklung Automatisierung Fertigung, Leipzig (*research, development, automation, production*)
- Institut für Energetik und Umwelt gGmbH, Leipzig (*energy and environment*)
- Institut für Stahlbau Leipzig GmbH (*structural steel*)
- Kunststoff-Zentrum in Leipzig gGmbH (*plastics*)
- SID Sächsisches Institut für die Druckindustrie GmbH Institut des Vereins POLYGRAPH e.V., Leipzig (*Saxon institute for the printing industry*)
- SINUS Messtechnik GmbH, Leipzig (*measuring technology*)
- TZO Technologie-Zentrum Oberflächentechnik und Umweltschutz Leipzig GmbH (*surface technology and environmental protection*)

In light of the above listings it becomes apparent that, beyond the universities, there is a specialised selection of industry-related research facilities existing in Saxony.

## 2.2 Fields of interest

Basically, university-industry cooperations may be created in two ways: either „from below“ through direct contacts between actors from both sectors, or by initiation and promotion by higher levels (EU, federal or state governments). Depending on their origin, the contents of cooperations may vary. For instance, cooperations grown „from below“ are decisively shaped by the individual interests of the participating actors. In contrast, cooperations initiated by higher levels primarily serve the purpose of realising political goals.

With regard to dealing with university-industry cooperations and their significance for regional development, the second variety is of particular interest. In this case, university-industry

cooperations may represent an approach to the improvement of regional competitiveness and for the creation of jobs.

For that reason, we would like to insert at this point a brief presentation of state technology policy, before subsequently describing the content-related main focal points of university-industry cooperations in the Free State of Saxony.

### **2.2.1 Technology policy under particular consideration of university-industry cooperations**

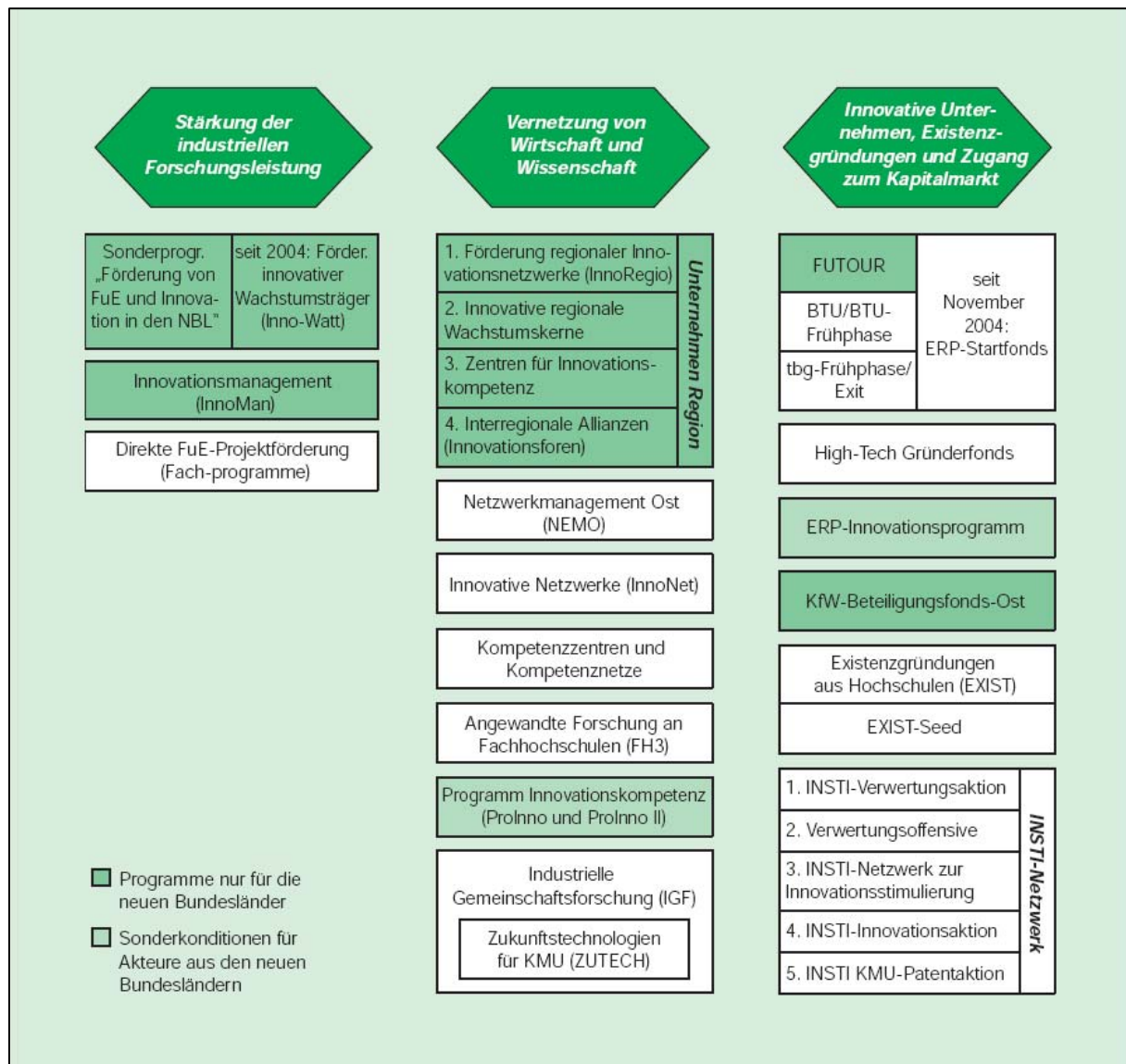
The objective of the state technology policy<sup>5</sup> is to promote research and development and to support the application of new technologies in the industry. Thus, technology policy is a wide ranging responsibility in which traditional policy areas such as economic, industrial and research policies are blended together. Aside from the actual creation process of new technologies, supplemented by technology transfer and the support of the diffusion of these technologies, the view of the innovation environment has changed in recent years (MEYER-KRAHMER 2005: 13). Among other things, this includes the organization of production, the qualification of human resources, training and adult education, venture capital, but also the close connection of social problems (e.g. traffic, health, environment) as well as technical, organizational and social innovations.

The development of innovation or technology by the federal government is aimed at three main areas: strengthening of industrial research capabilities, networking of industry and science as well as supporting innovative enterprises, business start-ups and access to the capital market (see Fig. 3). Thus, university-industry cooperations are in the focus of state innovation policy. This is emphasized by the number of corresponding development programmes. In this respect, the support of regional networks in eastern Germany is playing an important role. In this connection, special emphasis must be given to programme family „Entrepreneurial Region“ – including, among others, the initiative „InnoRegio“ by the BMBF.

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<sup>5</sup> The terms „technology policy“, „research policy“ and „innovation policy“ are in part used synonymously. Within this paper, the term technology policy has been preferred.

Fig. 3: Innovation sponsorship by the federal and state governments

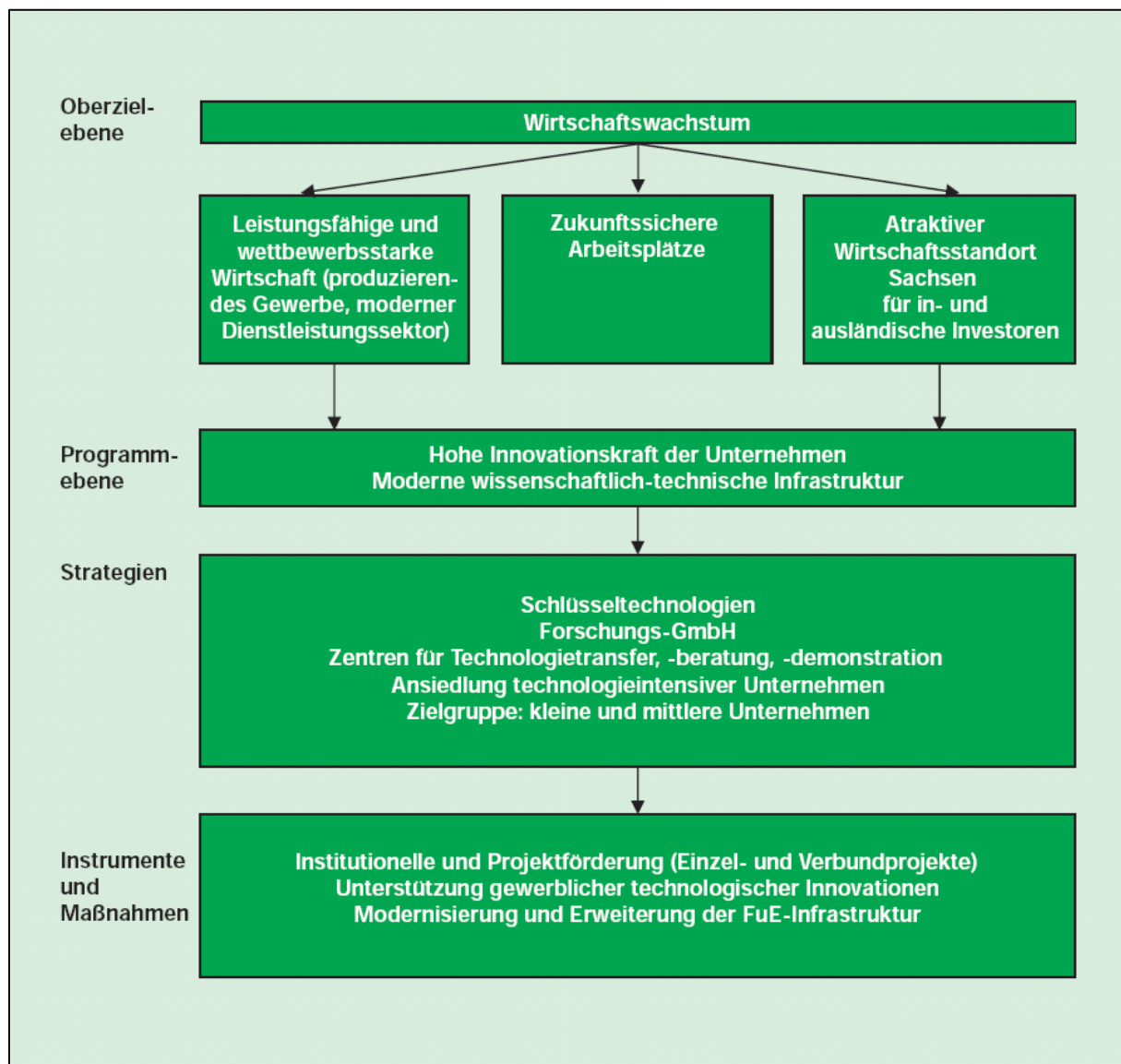


Source: KOSCHATZKY and LO 2005 in: SCHMALHOLZ 2005: 20

The main features of Saxon technology policy have been defined in the „Guidelines of Technology Policy“ (SMWA 1992). Aside from gradual adjustments, the guidelines, which were first drawn up in 1992, are still valid as of today.

In the early nineties, technology political activities of the Saxon government were marked by the renewal of universities and the science system. This modernization was accomplished in a relatively short time. However, since efforts to establish a broad-based, self-supporting industrial structure initially had failed, the main focus in the following years shifted towards the development of business enterprises. In these endeavours, the close connection between research in future-oriented research areas, technology transfer and the offensive utilization of new technologies by small and medium-sized enterprises played an important role right from the start.

Fig. 4: Logical objectives of guidelines of Saxon technology policy



Source: RIEDEL 2003: 148 in: SCHMALHOLZ 2005: 21

This paradigm change is expressed in the realignment of the main focus of business development: while in the early nineties the focal point was the support of research companies, meanwhile individual industrial projects and the development of associations have come the focus of attention. Their overall share of financing in 2004 amounted to 62 % compared to 27 % in the year 1992 (SCHMALHOLZ 2005: 23).

The guidelines define the technology political objective for the Free State of Saxony. The overriding goal of Saxon technology policy is to increase the growth dynamics in the state. For this purpose, it is intended to strengthen the capabilities and competitiveness of business enterprises, to create jobs that are safe into the future and to enhance the attractiveness of Saxony as an industrial site for investors from Germany and abroad (see Fig. 4).

The implementation of these objectives is to be achieved by a strategy bundle, consisting of the definition of priority key technologies, efficient shaping of the R&D infrastructure as well

as the development or enhancement of innovative capabilities of small and medium-sized enterprises.

The nine key technologies in the Free State of Saxony are:

- material sciences,
- energy technology,
- physical and chemical technologies,
- biological research and technology,
- microsystem technology,
- information technology,
- production technology,
- environmental technology,
- medical technology.

By concentrating of the development of these nine technologies, the Saxon Ministry of Economy hopes to gain greater efficiency. At the same time, impulse effects are to be created for the Saxon economy as a whole. The implementation of individual measures is being supported with the aid of development programmes. In this respect, the subsidiary principle and the principle of lending help for self-help are applied.

In the following, the Saxon technology policy is explained using the example of the biotechnology branch. This sector is also ideally suited for dealing with cooperations between scientific and industrial facilities.

### 2.2.2 SME, innovation, territory

The corporate structure of Saxony is characterized by **Small and Medium-sized Enterprises (SME)**<sup>6</sup>. For instance, 99.7 % of the 145,561 enterprises in Saxony are in this category, of which 128,471 are small companies with fewer than ten employees. 14,019 enterprises have between 10 and 49 employees, while 2,651 enterprises have between 50 and 249 employees (SMWA 2004: 61-62).

Thus, SME's are the „backbone“ of the Saxon economy. Economic growth and employment are based to a large extent on these enterprises. At the same time, these enterprises, particularly those with fewer than 10 employees, are at a strategic disadvantage in the market due to their limited human and financial resources. This applies, above all, to access to R&D results.

On behalf of the SMWA, the importance of the integration of SME in networks has been recognized: „[...] The small and medium-sized enterprises (SME) must therefore bundle their forces in *cooperations and networks*. Interesting opportunities are opened up for individual enterprises through *inter-enterprise cooperations*, such as bundling of resources and the

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<sup>6</sup> According to the classification of the EU Commission companies with up to 250 employees and a maximum annual turnover of about 50 million euros are considered small and medium-sized enterprises.

resulting stronger marketing powers up to the development of *new markets*. [...]”<sup>7</sup>. Therefore, target groups of network development are, above all, small and medium producing enterprises and service providers with a connection to industrial products, as well as relevant research facilities. The aim is to concentrate R&D development on SME, since there is a lack – aside from a few exceptions – of large corporations with distinctive R&D activities.

Aside from the „mass“ of SME, there are also a few so-called „lighthouses“, such as, for example, AMD, Infineon, VW or BMW, on which the reputation of Saxony as a dynamic and successful economical region in a national as well as international context is based. Emanating from these large corporations, there is a „pull“ on the regional economy. They provide the crystallisation cores for numerous suppliers.

This may be illustrated using the example of the automobile industry in Saxony (see Fig. 5): The automobile and supplier industry in Saxony employs about 60,000 people in about 450 enterprises. Volkswagen AG alone, at its sites in Zwickau, Chemnitz and Dresden today employs about 7,300 workers directly by the concern. About 5,500 new jobs have been created in the new plant of BMW in Leipzig, and about the same number of jobs has probably been created by suppliers in the area.<sup>8</sup>

Fig. 5: Autoland Saxony



Source: [www.amz-sachsen.de](http://www.amz-sachsen.de) (13.3.2006)

Since 1999, the Saxon Ministry of Economy has supported the Verbundinitiative Automobilzulieferer Sachsen (AMZ) (joint initiative of automotive suppliers), which has the stated objective of creating and developing of networks in the automobile industry. The AMZ intends contributing to increase the competitiveness of the Saxon automobile industry and

<sup>7</sup> [www.sachsen.de/de/wu/smwa/wirtschaft/industrie/netzwerke/index.html](http://www.sachsen.de/de/wu/smwa/wirtschaft/industrie/netzwerke/index.html) (14.12.2005)

<sup>8</sup> [www.sachsen.de/de/wu/wirtschaftsfoerderung/netzwerke/autoland/index.html](http://www.sachsen.de/de/wu/wirtschaftsfoerderung/netzwerke/autoland/index.html) (13.3.2006)

strengthen the numerous service providers. The task of the first phase to the end of 2002 was to promote innovations in products and processes through the formation of networks. In the time period from 1999 to 2002 a total of 87 projects were initiated and attended with 307 participating enterprises. In this way, the number of jobs was increased to more than 60,000 and a turnover increase of € 1.9 million was achieved by the suppliers. The second phase until 2006 is intended to contribute to the goal of linking the existing competences in strategic development fields. Innovation, process and delivery capabilities as well as the establishment of cross-border cooperations are viewed as main areas of further network development.<sup>9</sup>

This was followed in the year 2003 by the second Joint Initiative Machine Building Saxony (VEMAS). VEMAS is directed towards Saxon machine building and plant engineering organizations as well as their suppliers and production-related service providers. The responsibilities of VEMAS include intensification and expansion of cooperations within the industry and with important customers, supporting enterprises in the development of new business fields as well as in innovation management and technology development.<sup>10</sup>

With the beginning of 2006, two more joint initiatives were launched: „Bahntechnik Sachsen“ (railway technology) und „Technische Textilien“ (technical textiles). Thus, the Free State of Saxony, within the scope of these four joint initiatives, promotes the establishment of strategic networks in selected industrial branches.

The development of networks in the Free State of Saxony is based on the findings of recent economic-geographical and regional-economic research. Cooperation and communication between the actors participating in the network are intended to promote the creation of **innovations**. The physical proximity (**territorial dimension**) between the actors encourages the exchange between them and thus the creation of innovations.

### **The example of biotechnology**

The biotechnology branch is one of the key technologies in Saxony (see above). The starting point for the development of the biotechnology branch in recent years has been the BioRegio Initiative of the Federal Ministry for Research. While an application by Leipzig was unsuccessful in securing development funds from the BioRegio Initiative, the applicants and their partners, institutes of material sciences of the TU Dresden and Environmental Technology in Leipzig, presented their ideas to the Saxon Minister of Economy. A standpoint paper (1998) finally resulted in the launch of the biotechnology initiative **biosaxony**. A cabinet decision granted the provision of €210 million start-up financing (SCHMALHOLZ 2005: 23). The amount of provided funds makes *biosaxony* one of the largest programmes of its kind in Germany.

The establishment of the biotechnology structure as well as research and application oriented developments have been supported within the scope of *biosaxony*. For instance, € 40 million have been made available for the foundation of twelve biotechnology professorships in Dresden and Leipzig; while another €60 million are available for research projects.

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<sup>9</sup> [www.amz-sachsen.de](http://www.amz-sachsen.de) (13.3.2006)

<sup>10</sup> [www.vemas-sachsen.de](http://www.vemas-sachsen.de) (13.3.2006)

*biosaxony* is a constituent part of the overall „biotechnology offensive Saxony“, with which Saxony, aims to occupy an internally competitive position in the medium term and, in the long term, even a leading position in this key technology. Towards that end, it is intended to expand existing particular strengths in the fields of biomedicine, molecular biotechnology, biomaterial sciences and environmental biotechnology. The **bioinnovation centres in Dresden und Leipzig**, which have been established with state developmental funds, currently house more than 30 biotechnology firms and six scientific workgroups each at the Technical University Dresden and the University Leipzig. As of today, there are 53 core enterprises in the field of biotechnology in Saxony. More than half of these enterprises have been started up in the last four years, which in turn is an expression of the dynamism of the biotechnology branch in Saxony.

We would like to illustrate the working and function principles of these facilities using the example of the **BioInnovationsCentre (BIOZ) Dresden**. The BIOZ advertises with the motto „research and industry under one roof“. It is a founder's centre with the objective of networking the facilities of the industry, the universities and extra-university research facilities. The BioInnovationsCentre of the TU Dresden (BIOTEC)<sup>11</sup> is engaged in research in the fields of nanotechnology, biotechnology and at the interface to engineering sciences. The scientists are teamed up in interdisciplinary research groups:

- Genomics (Prof. Dr. Francis Stewart, Australia),
- Proteomics (Prof. Dr. Bernard Hoflack, France),
- Cellular Machines (Prof. Dr. Daniel Müller, Germany),
- Biophysics (Prof. Dr. Petra Schwille, Germany),
- Tissue Engineering (Denis Corbeil, France),
- Bioinformatics (Prof. Dr. Michael Schröder, Germany),
- Bioinformatics (Dr. Maria Teresa Pisabarro, Spain),
- Developmental Genetics (Prof. Dr. Michael Brand, Germany).

Further to that, the centre offers an international master's course on the subject of molecular bioengineering sciences.

The BIOTEC centre employs more than 80 scientists from a dozen different countries in Europe, Asia, America and Australia. The interdisciplinarity of the researchers is illustrated by the fact that they come from biology, medicine, physics, chemistry, computer and engineering sciences.

BIOTEC has obtained more the € 5 million in research funds in the last two years, among others, from BMBF, DFG, EFRE, EU, HFSP and the Volkswagen foundation.

BIOZ Dresden makes office and laboratory spaces available to enterprises and founders of new businesses from the biotechnology branch. In addition, the enterprises and new start-ups at the BIOZ are able to take advantage of service facilities, aside from a comprehensive pool of office equipment, they may also avail themselves of centrally offered services such as

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<sup>11</sup> [www.biotec.tu-dresden.de](http://www.biotec.tu-dresden.de) (6.1.2006)

a DNA sequencing unit, protein expression, mass spectrometry, bioinformation technology or light-optical and electron microscopy and thus considerable opportunities to save time and money.<sup>12</sup>

Another advantage offered by the site of the BioInnovationsCentre is the physical proximity to the Max Planck Institute for Cellbiology and Genetics (MPI-CBG) as well as other university facilities. The close contacts between enterprises, universities and non-university research facilities in the region of Dresden has resulted in additional cooperations and networks. For instance, a successful initiative, BioMeT, was launched within the scope of the InnoRegio Initiative of the BMBF.

***Excursus: the federal competition InnoRegio***

In April 1999 the federal ministry for education and research (BMBF) launched the competition „InnoRegio“. The objective of the initiative is to achieve a lasting improvement in the employment situation in eastern Germany and to strengthen competitiveness. For that purpose, networks are to be established on a regional level, in which actors from different sectors are engaged in joint innovation and learning projects. The cooperation between institutions and actors from industry, science, education and administration in the regional networks is intended to serve the purpose of utilizing existing potentials and contribute to a successful regional development. Thus, InnoRegio follows a general trend towards organizing regional development through competitions.

Beyond the actual competition itself, InnoRegio understands itself as an impulse generator: by scientific attending research, the procedures and innovative approaches tested in the competition are to be processed and analyzed and in this way made available for use in other regions. The objective is to obtain transferable models for the development of innovative regions.

For more information on InnoRegio go to: [www.innoregio.de](http://www.innoregio.de)

The **Network BioMeT Dresden**<sup>13</sup> is one of the successful participants in the competition InnoRegio. BioMeT was created in connection with the BMBF initiative, however, there had already been cooperations and contacts between participating actors, with which the relatively rapid setup of the network only became possible.

In the meantime, the BioMeT network unities 212 partners from different sectors: the largest share, with 93 members comes from the entrepreneurial side, while five universities and technical colleges as well as 24 non-university research facilities are the partners from science and research. With a total of 47 partners, the group of financial service providers (17) and legal, tax and management consultants (30) represent a comparatively large group. However, in connection with new products, processes, etc. and associated patent and legal issues, this relatively large number is quite understandable. Finally, public actors (federal and state governments, municipalities) as well as foundations, associations and societies are also members of the BioMeT network.

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<sup>12</sup> [www.bioz-dresden.de](http://www.bioz-dresden.de) (6.1.2006)

<sup>13</sup> [www.biomet-netzwerk.de](http://www.biomet-netzwerk.de) (13.3.2006)

Participating in 36 development projects with 76 partial projects are: 39 enterprises, 17 institutes of the TU Dresden and the TU Bergakademie Freiberg, 6 non-university research facilities, the MPI-CBG as well as 2 foundations.

The overriding goal of the BioMet network is to establish biotechnology in der region of Dresden as a second leg aside from microelectronics. In particular, it concerns

- the preservation and creation of jobs,
- links between natural sciences, engineering sciences, information technology and medicine,
- the development into a worldwide leading education, research and industry site in the future-oriented biotechnology sectors (nano-biotechnology, engineering and functional pharmagenomics).

The strategy of the BioMeT networks is designed to exploit existing innovation potentials through the cooperation of enterprises and scientific facilities, to selectively promote newly launched businesses from the ranks of science, as well as supporting the settlement of enterprises (BMBF 2000: 77). The vision of the BioMeT network includes, until the end of the developmental period in 2006, the launch of 25 new enterprises, 10 settlements of enterprises as well as the creation of 2,500 new jobs.

The interim balance in November 2004 revealed the following result: 16 enterprises launched, four more settled. Nearly 1,100 jobs were created, of those 583 in enterprises and 512 in research facilities. These figures are supplemented by further – even though difficult to measure – secondary created and secured jobs. Thus, the balance of the BioMeT network – in spite of very ambitious targets – is quite respectable. In addition, a biotechnology network with more than 200 partners was established in the region of Dresden. The competitiveness of enterprises and thus the overall development of the region was significantly enhanced with the aid of the InnoRegio developmental programme (see GWT 2005). A final balance of the regional effects of BioMeT can only be drawn up after completion of the competition.

### **2.2.3 Entrepreneurship and technology-based enterprises**

Regional-political action, aside from looking after existing enterprises, also includes the settlement and start-up of new businesses. Since the settlement of new enterprises is becoming increasingly more difficult, the support of enterprise start-ups is gaining more and more importance.

The existence of enterprises in Saxony is characterized by a high level of dynamism: new enterprises are launched on a daily basis, while existing ones are forced to close. In the year 2003 Saxon statistics showed 41,952 registered business, of those 37,543 new business start-ups, and 32,600 cancellations, of those 27,999 business closures (SMWA 2004: 63). The highest number of new businesses (10,809) were registered in trade, however, the highest number of cancellations (9,765) was also experienced here.

In comparison to previous years, the year 2003 showed a significantly higher growth in existing businesses. The balance of registrations and cancellations of 9,347 exceeded the result of the year 2002 (+750) by more than ten times. The last time a similarly strong growth as in 2003 had been experienced in Saxony was in 1996. Since then, the number of new

business registrations and cancellations had approximated each other more and more (SMWA 2004: 64).<sup>14</sup>

The universities are playing an increasingly important role in connection with the start-up of new enterprises. For that reason, we would like to present initiatives of universities for the support of business start-ups in the following.

### **Dresden exists**

A study by the University Cologne has shown that the founding dynamism is underdeveloped in der region Oberes Elbtal / Osterzgebirge (upper Elbe valley / eastern Erz Mountains). On a national scale, the region is only ranking 89<sup>th</sup> of 97 administrative regions (see UNIVERSITÄT KÖLN 2005). This deficit is where the initiative „Dresden exists“ comes into effect within the programme EXIST.

The initiative „EXIST – university-based start-ups“<sup>15</sup> by the Federal Ministry of Research started in December 1997. EXIST is aimed at improving the start-up climate at German universities and anchoring the subject of entrepreneurial independence in academic education. The objective is to increase the number of business start-ups out of academic institutions. For this purpose, it is intended to create regional cooperations between universities, institutes of higher learning, the industry and other partners (BMBF 2002; KOSCHATZKY 2001). For separate partial objectives are pursued with the aid of EXIST (KOSCHATZKY 2001: 8):

- The permanent creation of a „Culture of Entrepreneurship“ in teaching, research and administration at higher-education institutions targeting at students, university personnel and graduates;
- increasing knowledge spill over into economic value added;
- the goal-directed development of the large potential for business ideas and entrepreneurs at higher-education institutions and research establishments;
- a significant increase in the number of innovative start-ups and the resulting creation of new and secure jobs.

In August 1998, five EXIST networks were selected from a total of 109 submitted concepts, who have been working on the implementation of their concepts since the end of 1998. In the first developmental phase up until early 2002, the implementation was subsidized with more than € 15 million. After the expiration of the first developmental phase, he networks received additional financing for three more years, in order to stabilise the newly established network structures and to transfer their experiences to other founding networks.

One of the selected concepts is „Dresden exists“ in the region of Dresden.<sup>16</sup> In line with programme specifications, „Dresden exists“ is relatively strongly influenced by the TU Dresden. However, other regional partners, who intend to jointly support business start-ups

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<sup>14</sup> However, it must be pointed out that statistical effects have also contributed to this significantly higher balance of business registrations and cancellations.

<sup>15</sup> [www.exist.de](http://www.exist.de) (5.1.2006)

<sup>16</sup> [www.dresden-exists.de](http://www.dresden-exists.de) (5.1.2006)

out of the university, are also integrated in the network. Industrial actors are playing an important role in individual elements of „Dresden exists“, for example, in connection with financing and organisational issues.

Selected measures of „Dresden exists“ are (see BMBF 2002):

- Founder’s lobby: in cooperation with network partners, the founder’s lobby, as a public forum, offers a platform for everyone from the region interested in starting a new business. Every quarter, university students, young entrepreneurs and network partners willing to start a new business meet to exchange experiences and establish new contacts. Similarly to a trade show, the participants have the opportunity to attract attention to their ideas, products and capabilities. Various exhibitors provide information on financing and consulting offers; scientists from Dresden present innovative products and services which have been developed in research projects.
- Three-phase training programme: the training of students to become entrepreneurs is not an instant programme, but a processes covering an extended period of time. „Dresden exists“ has consciously committed itself to the entire process and thus extends a comprehensive range of care and support to founders. In the first phase, the curiosity of students with regard to starting a business is aroused. In the second phase, the entrepreneurial training begins by conveying special knowledge in teaching events (for example, development of a business idea). In the last phase, the start-up process begins. Business founders receive support from „Dresden exists“ in their organizational and planning tasks.
- Founder’sRoom at the TU Dresden: The Founder’sRoom is intended as a communication platform and meeting point for potential founders. It consists of the elements Founder’sSeminar, Founder’sCoaching and Founder’sRoom. Aside from subject-related lectures by practitioners, there is also the possibility of establishing contacts and receiving individual advice.
- Business field mining: a successful business start-up depends to a large extent on the quality of the business idea. Aside from the actual idea, what counts is, above all, the assessment of market potential. This is where business field mining comes in, which is designed to uncover attractive and future-oriented business fields. For example, „Dresden exists“ invited the regional enterprises Infineon Technologies AG and AMD to attend a creativity workshop. Overall, 76 suggestions for possible new products and services were collected, 20 of which were judged to offer large or very large market potential.
- Cross-faculty business plan seminars at the TU Dresden: here, participants work out business plans for concrete innovation or start-up ideas in mixed teams of economic sciences and engineering / natural sciences. The seminar is supported and sponsored by institutes of the TU Dresden in cooperation with partners from practice (regional holding company).
- Founder’sCard programme: the services available to founders are summarized in the Founder’sCard programme. The partner network assigns experienced coaches to assist the founders – based on their business idea – for example, in financial issues or with their human resources and organizational planning. The „Dresden exists“ Founder’sCard represents a seal of quality to promising business founders from universities. At the same

time, it comes with certain „perks“, such as, for example, the use of the Founder'sRoom and individual coaching to the establishing contacts to capital investors, Business Angels or sponsors. The Founder'sCard is awarded by a selected jury consisting of partners of „Dresden exists“.

There are no exact figures available on the number of business start-ups by graduates of the TU Dresden, however, there are certain clues in the start-up activities within the scope of „Dresden exists“ to allow an estimate: For instance, between 1998 and 2003 about 100 start-ups with 150 founders have emerged from the project. Thus, in comparison to the other four regions of EXIST, Dresden shows the highest levels of start-ups (REGIONOMICA 2005: 161-162). Nevertheless, „Dresden exists“ estimates the number of potential founders in the region of Dresden to be about 3,900; and as many as 17,000 persons are thought to be interested in starting a business.

Meanwhile, after the development of the second phase of the competition has run out, the responsible actors are investigating to what extent the financing may be continued in other ways.

### **UGB Leipzig**

The business start-up office ugb Leipzig supports business start-ups in the preparatory, founding and introductory phases.<sup>17</sup> The main focal points of the ugb Leipzig are:

- provision of individual information materials,
- giving advice regarding the business administration concept,
- offering seminars and professional consultations,
- providing advice on adequate insurance coverage,
- procurement of commercial real estate,
- guidance for dealings with municipal administration.

The ugb Leipzig is a joint initiative of the following partners:

- Sparkasse Leipzig: the Sparkasse Leipzig supports business start-ups in all questions of financing, from planning to implementation. The Unternehmensbeteiligungsgesellschaft GmbH (holding company) of the Sparkasse Leipzig offers direct as well as silent partnerships in innovative and job-creating enterprises in the region.
- The city of Leipzig is committed to the development of innovations; business start-ups are being supported in Leipzig intensively and in many different ways.
- Rural district Leipzigerland: the rural district of Leipzig supports young entrepreneurs in the region. With the Technology Centre Campus Espenhain, an innovation site has been created that offers young businesses know-how as well as office space.
- IHK Leipzig: the chamber of industry and commerce of Leipzig offers regularly schedules business start-up seminars. It provides comprehensive advice for the first steps of starting a new business and helps in overcoming „stumbling blocks“.

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<sup>17</sup> [www.ugb-leipzig.de](http://www.ugb-leipzig.de) (11.1.2006)

- HWK Leipzig: the chamber of handicrafts of Leipzig offers a wide range of consultations for business start-ups in handicrafts.
- BIC Leipzig: the Business & Innovation Centre Leipzig (BIC) serves as a main drop-in centre for all issues concerning business start-ups and innovations.
- Bio-City Leipzig: the so far most ambitious biotechnology project of the city of Leipzig has been realized with Bio-City Leipzig. Since its completion in 2003, scientists and business founders find optimal conditions here for the realization of their goals.

The listing of participating partners illustrates that the promotion of business start-ups is a joint initiative of municipal and industrial partners. This has greatly contributed to the success of the initiative and in business start-ups.

### **SAXEED**

In the region of south-west Saxony, business founders may avail themselves of a comprehensive range of consultation offers, for example, on issues of selecting the proper legal form, founding formalities, financing and financial development, key technologies or marketing for interested founders.

At the same time, established enterprises are available to give advice and support to business start-ups. SAXEED<sup>18</sup> offers its know-how and tools for the support of young businesses from exactly this entrepreneurial point of view.

Founding members of the SAXEED network are:

- the TU Chemnitz,
- the Westsächsische Hochschule Zwickau (FH) (*technical college*),
- the Hochschule Mittweida (FH) (*technical college*).

The participating universities and research facilities are able to look back on long years of experience and know-how in engineering sciences, in particular in machine building and electrical engineering for the automobile industry and its suppliers, as well as the electronics industry.

The regional economy is also characterized by these branches. In recent years increasingly flowing investments have created a modern and internationally competitive R&D infrastructures. Steadily growing numbers of students also confirm the high level of attractiveness of the universities and colleges.

Since the start of the project in September 2002, SAXEED has had the following responsibilities:

- attending to and coaching of concrete founding and growth projects,
- sensitizing and motivating by means of versatile public relations,
- supporting the generation of business ideas with events, workshops and cooperation / exchanges with patent workgroup,

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<sup>18</sup> [www.saxeed.net](http://www.saxeed.net) (11.1.2006)

- training and further education of persons interested in starting a business by means of organized founder's colleges, regularly scheduled teaching events and locating existing educational opportunities,
- acquisition and qualification of teaching personnel from research and practice,
- project management.

In the meantime, SAXEED has already been integrated into the follow-up project. This opens up additional opportunities for the development of other interesting business models.

Thus, in summary, it may be stated that universities have a very important role to play in the support of business start-ups. Many new business ideas (products, processes) have their origin in application-oriented research. Two ways are imaginable to bring these ideas to market or to transform them into concrete business ideas: on the one hand, through cooperation with enterprises in regional networks, in which scientific results are made available to enterprises and, on the other hand, in form of university-based start-ups. Both ways are widely used in Saxony, even though the universities have increased their role and contributions only in recent years. This is illustrated by the fact that the initiatives presented here have only been created in recent years.

In this respect, the roles and responsibilities of the universities are varied. One important task they fulfil consists of establishing contacts to relevant enterprises, but also to experts in legal and financial issues, thus, as it were, playing the role of mediator. In addition to that, they also give a platform to those willing to start a business by providing office space and equipment (e.g. labs, data processing), know-how (through employed scientists and staff) and, if applicable, financial support.

As regional actors, universities also have contacts to other important actors (municipalities, financial institutions, chambers), which are also significant with regard to business start-ups. This also includes, among other things, that they already establish contacts to enterprises while students are still attending courses to allow the development of long-term contacts between enterprises and universities and students, which may later grow into a professional cooperation. At the same time, students may also transfer know-how during their studies, for example, within the scope of traineeships, from business enterprises to universities.

#### **2.2.4 Qualifications and labour market**

The economical success of enterprises – and thus, in the end, of entire regions – depends, among other things, on the availability of qualified and skilled personnel. The discussion on the lack of qualified personnel has been going on for a few years now in the Free State of Saxony with increasing intensity (see, for example KRALINSKI, NOLLE 2002). For instance, in more and more branches, a gap is predicted between the demand and supply of skilled personnel in the medium to long term, with the gap being more of a qualitative and less of a quantitative nature (REGIONOMICA 2004). Some branches and regions already experience a deficit of qualified personnel today: For instance, in the IT branch and in the automobile industry there is a lack of lathe and milling operators. Due to the continuing migration and age-structural changes, a lack of trained and skilled personnel is expected in other branches and regions, as well.

Against this backdrop, the assurance of a quantitative and qualitative sufficient potential of skilled personnel is gaining importance in order to safeguard the competitiveness of the Saxon economy in the long term. Thus, qualifications and the labour market are among the most essential subjects of regional development and politics. Due to the changing lifestyles and working environments, as well as a better educated public in general, a good apprenticeship or university education alone is no longer sufficient. Rather, the trend today is toward lifelong learning, in order to „keep up“ with ongoing changes.

This is where the programme „Learning Regions – Development of Networks“ comes in, which is being implemented by the federal ministry of research in cooperation with the federal states and is supported by the European Social Fund. The aim is to promote the formation of regional learning networks. In particular, the programme pursues the following goals (BMBF 2004c: 6):

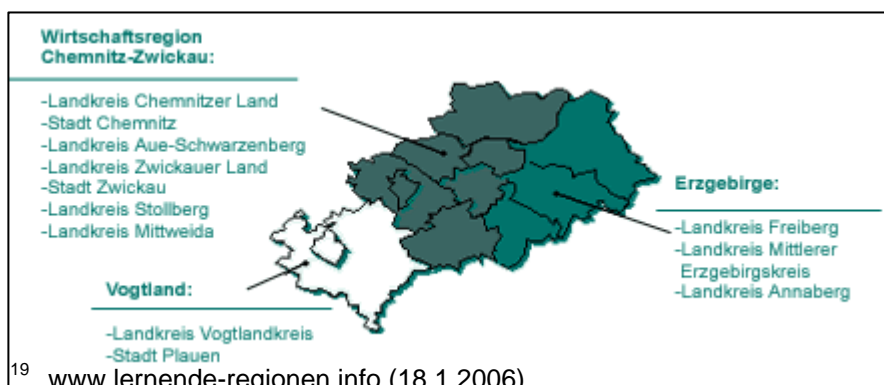
- strengthening the learner’s personal responsibility and self-management
- motivating disadvantaged groups that are currently less involved in education
- strengthening relations between all educational sectors
- cooperation of educational providers and users
- improving the quality, quantity and structure of offers, in order to promote user-orientation in particular.

Nationwide there are 72 networks supported by the BMBF initiative, among them five in the Free State of Saxony: educational management in der Learning Region Zwickau, Learning Region „Education Forum Southwest Saxony“, Leipzig is Learning – a region going through change, Regional Learning Forum in the industrial area between Elbe and Elster as well as PONTES – Learning in and for Europe. Building bridges in the Euregio Neiße.<sup>19</sup>

### Learning region „Education Forum Southwest Saxony“

We would like to illustrate the working and function principle of the initiative using the example of the „Education Forum Southwest Saxony“. For a few years, there have been several successful SME networks in operation in various branches in the region of southwest Saxony (see Fig. 6). In contrast to that, there is just a smattering of fledgling networks in the area of training and adult education, which have not yet been able to develop a comparable stability over an extended period of time. Comprehensive educational cooperations are still in their beginnings.

Fig. 6: Learning Region „Education Forum Southwest Saxony“



Source: <http://www.bildungsforum-sws.de/> (18.1.2006)

In accordance with programme definitions, the global objectives of the BMBF initiative in the individual regions are adapted under consideration of regional needs and put in more concrete terms by appropriate measures and projects. The objective is to promote a culture of lifelong learning in the regions. For this purpose, various educational facilities are put into touch with associations, municipal administrations and the industry.

In the Education Forum Southwest Saxony, the cooperation partners are:

- Professorship for adult education and in-house training at the TU Chemnitz (project management),
- Bildungsinstitut Pscherer gGmbH, Lengenfeld,
- CJD Chemnitz im Christlichen Jugenddorf Deutschlands e.V., Wiesa,
- EBW Erzgebirgisches Bildungswerk e.V. Gemeinnützige Bildungseinrichtung, Pockau,
- EVA-Erzgebirgischer Verein für Arbeitsförderung e.V., Olbernhau,
- F+U Gemeinnützende Bildungseinrichtung für Fortbildung und Umschulung Sachsen GmbH, Chemnitz,
- IZ Innovationszentrum Plauen / Vogtland GmbH, Plauen,
- SAEK – Sächsischer Ausbildungs- und Erprobungskanal, Chemnitz,
- Seniors College at the TU Chemnitz,
- Saxon Centre for Political Education, Chemnitz,
- Umweltservice GmbH, Marienberg,
- Wirtschaftsförderung Annaberg GmbH, Annaberg-Buchholz.

It is the aim of the cooperation partners – with inclusion of additional actors – to develop an educational structure tailored to the needs of the region, as well as joint educational activities: „In establishing the network Educational Forum Southwest Saxony, priority was given in particular to the transparency between educational sectors, better meshing between general, political, cultural and professional education and improved cooperation between educational, employment and labor market policy, industrial development as well as further regional actors.“<sup>20</sup> From this, the following objectives of the network Education Forum Southwest Saxony have been derived in particular:

- public relations to enhance the images of participating facilities, joint marketing and development of new markets,
- contribution to the adaptation and optimization of the educational curriculum,
- elaboration and adjustment of specialization profiles for educational bodies,

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<sup>20</sup> <http://www.bildungsforum-sws.de/> (18.1.2006)

- meshing of individual educational sectors with each other and development of interfaces between various actors,
- joint quality management, study for the establishment of a regional certification system for educational bodies,
- exploration and development of previously underutilized human resources potential for medium-sized businesses in the region,
- fight against the migration of young people and skilled personnel from the region by demonstrating and creating opportunities for education, development and jobs in the region,
- continued education for management personnel and staff of educational facilities (e.g., use of modern methods and media, foreign languages and intercultural communication for educational jobs abroad),
- regional and cross-regional exchange of experience.

The project term is broken down into two phases: in the first phase (07/2002 – 06/2004) work subjects were allocated to four partial projects. For instance, a „teaching workshop“ was set up within the scope of a partial project, which was intended to initiate new ways in vocational orientation and development of skilled personnel. Under the auspices of Wirtschaftsförderung Annaberg GmbH, facilities for the vocational development of women, innovation centres, vocational training centres as well as facilities of municipalities and rural districts are cooperating. In the second phase (07/2004 – 06/2006), a restructurization took place, in the context of which the original four subject areas were transformed into five. Vocational and work environment orientation as well as continued education continue to play an important role. The Wirtschaftsförderung Annaberg GmbH attends to, jointly with other project partners, the „development of young people and creativity“, which has the objective of attracting youths to technical professions as well as innovation carriers in enterprises of the region and promoting their capabilities for creative, innovative and entrepreneurial thinking and actions.

### **LEONARDO Office PART Saxony**

The activities of Saxon universities towards the implementation of the European vocational education programme LEONARDO DA VINCI can also be considered as part of the processes of lifelong learning. Since 1995, the LEONARDO OFFICE BÜRO PART SAXONY has established itself as a service office for meanwhile 13 Saxon universities and colleges for the joint implementation of this programme at the interface university/industry. Since then, the office has coordinated twelve mobility projects for the placement of students or university staff for traineeships in the industry and five pilot projects in the area of training and continued education. In addition, the office has also participated in three European pilot projects as a partner. The objective of all projects is to promote cooperation between Saxon and European universities and enterprises in order to contribute to increasing the quality of training and continued education, thus enhancing the opportunities of entering the job market or advancing the chance of promotion in the workplace on a long-term basis. The achieved effects for the participating target group, as well as the region, are illustrated using the example of student mobility in the following:

Aside from the Technical University Dresden as applicant, the following universities and institutes have been participating partners in the implementation of the LEONARDO mobility projects:

- Technical University Bergakademie Freiberg,
- Technical University Chemnitz,
- Technical University Dresden,
- International College Institute Zittau,
- College of Fine Arts Dresden,
- Academy of Visual Arts Leipzig,
- Academy of Music Dresden,
- College Mittweida (FH),
- College Zittau/Görlitz (FH),
- College for Technology and Economy Dresden (FH),
- College for Technology, Economy and Culture Leipzig (FH),
- West Saxon College Zwickau (FH),
- Vocational Academy Saxony – State Academy Breitenbrunn.

Between 1995 and 2003, 955 Saxon and European students sponsored through the programme. For that purpose, EU subsidy funds in the amount of € 1,608,655 were obtained, of which students were supported directly with € 1,451,644 Euro in form of scholarships. An additional amount of € 1,056,985 was contributed to the projects by business enterprises. These funds were also made available directly to students in form of remunerations or subsidies during their traineeships. The region has participated through allocation of funds by the Saxon Ministry for Science and Arts in the amount of € 341,519 for the administration and implementation of projects by the LEONARDO OFFICE PART SAXONY.

A look at the unemployment rates in Germany for December 2005 in East and West (East: 17.3 %, West: 9.5 %) reveals that the economical development in East Germany is still a long way from reaching the level of West Germany and that some problems, such as an aging population, the migration of young people (above all university graduates, as well), rather have become even worse. In Saxony, unemployment has increased almost four-fold since the political turnaround and is particularly high in border regions, as well as in Leipzig and Chemnitz. These figures are mentioned here to emphasize the special need of the Saxon industry for qualified management staff and for innovation, development and enhancement of market opportunities in German and in Europe.

More than half of the students come from the region. Especially this group is being approached by the LEONARDO OFFICE PART SAXONY, with a view towards the portrayed job market situation, with interesting offers of traineeships in Europe, in order to give them the possibility of a selective preparation for their start into working life after completing university studies. In the traineeships, aside from enhancing professional and language skills, participant can acquire market economic as well as intercultural competences, which are of particular significance for Saxon enterprises – above all, for SME.

The following mobility project were completed since 1995 (see Fig. 7):

Fig. 7: LEONARDO mobility projects in Saxony since 1995

<b>Title of project</b>	<b>Duration</b>	<b>Number of partners / Number of countries</b>	<b>Total budget in €</b>	<b>LEONARDO subsidy in €</b>	<b>Own share / acquired funds in €</b>
Transnational placement and exchange programmes – cooperation object between universities and industry <i>D/95/2/95/Mtr/II.1.2a/FPI</i>	01.09.95 - 31.04.97	29 partners from 8 countries AT, BE, DE, ES, FR, IT, SE, UK	208,172	41,714	166,458
European placements for students and graduates – PART SACHSEN <i>D/96/2/0466/PL/II.1.2a/FPI</i>	01.12.96 - 31.05.99	92 partners from 16 countries AT, BE, CZ, DE, ES, FIN, FR, GR, IRL, IT, NL, NO, PL, PT, SE, UK	263,300	145,354	117,946
Work placements of students and graduates in a changing economic and technological environment <i>D/97/2/0476/PL/II.1.1a/FPI</i>	08.12.97 - 07.04.00	71 partners from 16 countries AT, BE, DE, DK, ES, FIN, FR, GR, IRL, IT, NL, NO, PT, SE, SK, UK	275,398	157,452	117,946
Europ. work placements for students and graduates for the stimulation of relations between eastern, central and western European universities and enterprises <i>D/98/2/05777/PL/II.1.2a/ FPI</i>	01.12.98 - 30.03.01	96 partners from 19 countries BE, BU, CZ, DE, DK, ES, FIN, FR, GR, HU, IT, NL, NO, PL, PT, RO, SE, SK, UK	299,675	115,841	183,834
Commitment of students and graduates in small and medium enterprises abroad to enforce the European reality <i>D/99/2/07093/PL/II.1.2.a/FPI</i>	01.12.99 - 31.05.01	116 partners from 22 countries AT, BE, CZ, DE, DK, ES, FIN, FR, GR, HU, IRL, IT, NL, LT, LV, NO, PL, PT, RO, SE, SK, UK	204,939	109,514	95,425
Commitment of students in small and medium enterprises abroad in order to implement European integration <i>D/2001/PL-12036</i>	01.06.01 - 31.05.03	105 partners from 21 countries AT, BE, CZ, DE, DK, ES, FIN, FR, GR, HU, IRL, IT, LT, NL, NO, PL, PT, RO, SE, SK, UK	545,082	295,299	249,783

Broadening the European horizons for <u>students</u> through placements in small and medium enterprises <i>D/2002/PL-22036-S</i>	01.06.02 - 31.05.04	114 partners from 26 countries AT, BE, BG, CH, CZ, DE, DK, EE, ES, FIN, FR, GR, HU, IRL, ISL, IT, LT, LV, NL, NO, PL, PT, RO, SE, SK, UK	597,057	316,960	280,097
Broadening the European horizons for <u>graduates</u> through placements in small and medium enterprises <i>D/2002/PL-22036-G</i>	01.06.02 - 31.05.04	78 partners from 23 countries AT, BE, BG, CZ, DE, DK, EE, ES, FIN, FR, GR, HU, IT, LT, LV, NL, NO, PL, PT, RO, SE, SK, UK	184,214	85,617	98,597
European placements for students considerably improve the chances on the German and European academic labour market <i>D-2003/PL-32036-S</i>	01.06.03 - 31.05.05	149 partners from 27 countries AT, BE, BG, CZ, CH, CY, DE, DK, EE, ES, FIN, FR, GR, HU, IE, IT, LT, LV, NL, NO, PL, PT, RO, SE, SI, SK, UK	647,687	340,893	306,794

Source: LEONARDO OFFICE PART SAXONY

## 2.3 Instruments, structures, measures

This chapter deals with the instruments, structures and measures of regional university-industry cooperations. In addition to already introduced approaches, further instruments and measures are presented here. To illustrate the spectrum, various different instruments and measures are introduced: from technology transfer facilities to patent applications to foundation professorships. Public programmes with the object of cooperations between science and industry are covered in Chapter 2.4.

### Technology transfer facilities

The competitiveness of business enterprises depends to a large extent on the ability to generate innovations, i.e. the ability to utilize new knowledge for innovation processes (see above). In particular SME often do not have sufficient R&D capacities and therefore are dependent on external knowledge. In order to accelerate the technology transfer between research facilities and users, the Free State of Saxony has supported the establishment and profiling of a state-wide network of transfer facilities in recent years.

The responsibility of these facilities is, through consultation, mediation and dissemination of information, to make it easier, above all, for small and medium-sized enterprises, to gain access to technological know-how (SMWA 2004: 77). The Saxon Ministry of Economy supports the activities of these facilities through need and result oriented projects, which are aimed at the activation, acceleration or improvement of technology transfers and technology oriented business start-ups.

The network comprises 42 technology centres, which are responsible for technology consultations, technology placement and technology oriented support of business start-ups. The technology transfer network in Saxony includes:

- two patent information centres at the Universities Chemnitz and Dresden,
- four technology consultation centres (technology agencies) in Chemnitz, Dresden, Görlitz and Leipzig,
- 15 technology transfer centres with specific alignments,
- 21 technology and founder's centres (TGZ).

The technology and founder's centres offer, aside from advice and services, mainly office space for the start-up of young, innovative businesses. In the year 2003 there were 660 companies with about 3,820 employees residing at the TGZ.

The TU Dresden has its own technology transfer facility, the **Gesellschaft für Wissens- und Technologietransfer der TU Dresden mbH** (GWT) (association for knowledge and technology transfer). The GWT implements research projects on behalf of business enterprises and public authorities, develops new products and technologies and offer a comprehensive range of innovation services. It was founded in 1996 and meanwhile employs a staff of about 170 as well as 250 scientists from various different special fields. Its total turnover in 2004 was € 16 million, about 7.2 % of which was achieved abroad.<sup>21</sup>

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<sup>21</sup> [www.gwtonline.de](http://www.gwtonline.de) (7.12.2005)

## Patent applications

Innovations, particularly in the early phase, require legal protection against competitors in order to assure a successful introduction to the market. For that reason, the patent information centres at the Universities of Chemnitz and Dresden may be viewed as further building blocks of university-industry cooperations. The patent information centres are the first contact address in issues of protecting commercial rights towards the public at large. They support researchers with information on the „state-of-the-art“, on violation of protection rights, design protection, registered trademarks, services and classifications. Further to that, they assist in working out research strategies and accept trademark applications.<sup>22</sup> Therefore, the patent information centres are playing an important role with a view towards legal protection of „inventions“ as well as the transfer of university knowledge for entrepreneurial use.

In order to illustrate application oriented research in engineering sciences, the CENTRUM FÜR HOCHSCHULENTWICKLUNG (CHE), (centre for university development) Hannover, is conducting a patent analysis in these subjects with in the scope of its research rankings. For that purpose, it is determined how many patents each professor has applied for in the last three years. This is achieved by a name-based inquiry from the patent database of the German Patent Office (PATDPA) in Munich.

According to the latest survey by the CHE, ten patents were registered by professors of the TU Dresden and six patents were registered by professors of the TU Chemnitz annually in the field of electrical engineering and information technology. This equals 1.6 respectively 1.4 patents per professor over a time period of four years (CHE 2005: G-9). Thus, both universities occupy a middle ranking among technical universities in Germany.

## Foundation professorships

Finally, foundation professorships may also be interpreted as a form of form of university-industry cooperation. A foundation may have different origins, but frequently the regional industry appears in the role of the donor. With their donations, donors recognize the respective university as a competent partner. At the same time, the donor is hoping for direct benefits for his foundation, in particular immediate access to new research findings. The foundation professorship is permanently assigned through a regular appointment process. As a rule, the foundation term is five years, after that, the foundation professorship is financed through state funds.

Examples of foundation professorships at the TU Dresden:

- mobile messaging systems,
- semiconductor physics,
- systems engineering,
- Jean Monnet professorship for the right of European integration and comparison of laws under particular consideration of central and eastern Europe,
- SAP foundation professorship for entrepreneurship and innovation,

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<sup>22</sup> <http://www.bibliothek.tu-chemnitz.de/piz/piz1.html> (17.12.2005)

- urban renewal and urban research,
- energy management,
- clinical-therapeutical basics of day-clinic treatment of eating disorders,
- stem cell transplantation,
- Dresden Chamisso poetics lectureship,
- internal medicine with focus on diabetology and endocrinology.

Foundation professorships are a relatively small element in connection with university-industry cooperations. With regard to a comprehensive effect on a regional scale, they are, viewed individually, not very significant. However, in connection with other instruments and initiatives, they may form one of the building blocks in a comprehensive cooperation.

## 2.4 Public programmes

In light of the above expositions, it is already apparent that a large number of university-industry cooperations have been created by external incentives or impulse sources. Therefore, this chapter deals with the importance of public programmes for university-industry cooperations. For this purpose, first of all, reference is made once again to Saxon technology policy, before subsequently the influence of feral programmes is illustrated using the example of the initiative „Unternehmen Region“ (entrepreneurial region).

### 2.4.1 Network strategy of the Saxon government

The realization of technology-policy objectives (see above) is supported on the level of measures through the development of institutions and projects. Individual as well as joint projects are being sponsored. The support of networks – on the one hand, between enterprises along the value creation chain and, on the other hand, between actors from different sectors (e.g. between enterprises and universities) – is an essential element of Saxon technology policy.

The development of networks is a basic feature of various political fields in the Free State of Saxony. Within the state government, various different departments avail themselves of the network instrument to achieve their specific objectives and reach their target groups. For instance, among others, the industry, medium-sized business and technology policy, but also training and continued education. In addition, networks are used for regional political purposes. However, there is no overriding goal for the development of network in Saxony. Each policy field defines specific focal points, so that the underlying understanding of the network is also different and the instruments of network development vary. The network strategy in some policy fields is presented in the following.

The Saxon **medium-sized business policy** avails itself of network support in order to compensate for size-related disadvantages, particularly of small and medium-sized enterprises. The corporate structure in Saxony is dominated to 99 % by SME, which are at a competitive disadvantage due to their lack of capacities. These disadvantages are to be overcome with networks and cooperations.

Aside from entering existing markets, SME networks are intended to contribute to opening up „tomorrow’s markets and technologies with outstanding importance“. Because, in small enterprises there usually is a lack of financial as well as human resources for in-house research and development. Therefore SME are dependent to a particularly large extent on a „functioning technology transfer and the cooperation with capable external research facilities“ (SMWA 2003).

The approach of joint initiatives (see above) in **industrial policy** (e.g. Automotive Suppliers Saxony AMZ) supports, first of all, the start-up and development phase of networks. Participating enterprises initially receive support by the project organizer of the joint initiative on a strategic level for the establishment and development of the network. As soon as cooperation partners have been found and have joined forces and operational cooperation and network activities are in progress, the project organizer withdraws. Further support is then given within the scope of the medium-sized business guideline, joint project sponsorships and other development programmes.

Therefore, public sponsorship is directed towards branch-specific associations. In particular, special emphasis is given to networks that are characterized by their strategic alignment (especially future-oriented branches) and long-term basis. Nevertheless, there are specific goals depending on different alignments, which are pursued with network development by the respective departments of the SMWA.

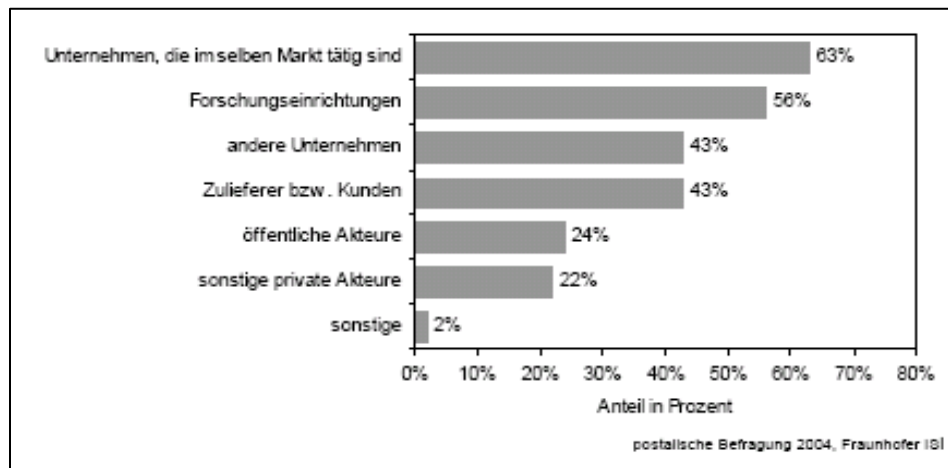
While the medium-sized business and industrial policy first of all promotes branch-specific networks, the cooperation of R&D joint projects with research facilities plays a major role in **technology-policy development**. On account of the Saxon situation with a high incidence of small businesses, the state since 1992 has been promoting joint projects of enterprises and research facilities for the purpose of technology transfer (see Fig. 8). According to the development guideline of the SMWA on R&D joint development<sup>23</sup>, this is to create a new incentive for the development of new or new types of products and processes, by reducing the frequently above-average economical and technical risk of development. The associations are intended to allow an objective-oriented and work-sharing interaction between partners, so that available research and development potential may be exploited effectively, technology transfer may be improved and problem-oriented research and development is assured.

The network development is directed towards the development of long-term-oriented networks. Therefore, R&D project of larger enterprises, which function as crystallizing cores in the research infrastructure, are also supported. Since the beginning of R&D development, a total of € 439 million has been made available for 1,043 individual projects and a total of € 316 million for 579 joint projects (BMBF 2004a).

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<sup>23</sup> Promotion guideline of the Saxon State Ministry for Economy and Employment on granting of funds for innovative technology-oriented joint projects in the area of future technologies in the Free State of Saxony (R&D joint promotion) of 7. February 2001.

Fig. 8: Type of network members



Source: ISI, TOP 2004: 97

The concept of branch-related key technologies is increasingly being replaced by project-specific bundling of technologies and entrepreneurial function areas. In this respect, the Saxon Ministry of Economy functions as initiator, financier and moderator of processes. Thus, it not infrequently takes on a controlling function, even though it delegates this (in part or later) to sub-level facilities. Examples of this are the Biotechnology Offensive Saxony, the Network BioMeT Dresden, BioPolis Dresden, Silicon Saxony or the Innovation Network Textiles (SCHMALHOLZ 2005: 25).

Meanwhile, the development of networks has become one of the main elements of technology development in the Free State of Saxony, based on new findings of recent economic-geographic research. According to these, the major advantage of networks consists of being able to joint actors from different sectors (economy, science, research, administration, politics) in comparatively easy fashion, in order to achieve common goals. One of the characteristics of networks is that the participating actors contribute their know-how, from which innovations may be created. One important prerequisite for that is a basis of trust between actors. Trust is not created overnight, but requires time. Therefore, the creation of networks should be understood as a long-term process. Once a bond of trust has been established, networks offer further potentials from which new, additional ideas may be developed.

Those carrying political responsibility should be quite aware of this. Frequently, networks are being viewed as a „cure all“ for regional development. However, networks cannot be promoted out of „nowhere“. They must be allowed to grow out of themselves. The role of state actors consists of providing suitable basic conditions and incentives for the creation of networks.

A study by the TU Chemnitz on SME networks in Saxony has identified the following potentials for success (TU CHEMNITZ 2002: 7f.):

- joint representation of interests and new contacts through establishing relations to new business partners, customers and other persons,

- expanding capacities and competences through the number and know-how of network partners, thus having immediate effects on the business administrative results of network partners,
- using the advantages of work sharing and specialization by concentrating on the respective economically attractive core business,
- extending the entrepreneurial range of effectiveness through regional, inter-state and transnational as well as inter-branch networks, thus having an immediate positive impact on the expansion of markets and sales,
- inclusion of research facilities in SME networks to strengthen innovative powers, among others, in the development of human resources, products, technologies and organizations of network partners,
- increasing marketing presence through utilisation of modern information, communication and multimedia technologies,
- applying new forms of knowledge management in the network.

The importance of the inclusion of research facilities as well training and education institutions and schools in the networks must be particularly emphasized. In this way, close relations to the research sector and to vocational training are established.

The InnoRegio programme of the Federal Ministry of Research plays an outstanding role in relation to linking of technology-political and regional-political goals. For instance, the formation of regional networks is an essential prerequisite for granting of development funds. For that reason, in the following we would like to take a look at federal programmes and their impact on the development of regional industry-university networks.

#### **2.4.2 Federal programmes for the development of innovations**

With its InnoRegio initiative, the Federal Ministry of Education and Research initiated a new phase of innovation policy in east Germany in the late nineties. The intention was to utilise existing potentials through the development of regional networks for a positive economical development. This concept was quickly able to show initial success, so that so that in the meantime a number of follow-up programmes were launched (by other federal ministries, as well), which picked up on the basic idea of InnoRegio and carried it on. InnoRegio itself was grouped together with other BMBF initiative into the programme family „Unternehmen Region“ (BMBF 2004b) (also refer to Ch. 2.2).<sup>24</sup>

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<sup>24</sup> <http://www.unternehmen-region.de/en>

Fig. 9: Entrepreneurial region – networks



Source: [www.unternehmen-region.de/en](http://www.unternehmen-region.de/en)

„Unternehmen Region“ (entrepreneurial regions) consists of five individual programmes (see Fig. 9):

- InnoRegio,
- Innovative regional Wachstumskerne (*Innovative Regional Growth Cores*),
- Zentren für Innovationskompetenz (*Centres for Innovation Competence*),

- Interregionale Allianzen für die Märkte von morgen (*Interregional Alliances for Innovation Competences*),
- InnoProfile.

The objectives of the programmes are enhancing the competitiveness of business enterprises, profiling of regions, starting up of innovative enterprises, reducing the migration of young workers and creating attractive development opportunities for young scientists. More than € 500 million have been set aside for this purpose in the time period from 1999 to 2007.

### **InnoRegio programme**

The programme structures and working principles of these network programmes are explained in the following using the example of the InnoRegio initiative.

InnoRegio is aimed at the development of innovation potentials in order to achieve in this way a lasting improvement of competitiveness, value creation and employment in east Germany. The foundation for this are regional innovation networks („InnoRegios“), in which the most important actors are joined (see BMBF 1999).

The development guideline of the competition was deliberately kept in general terms. It was neither addressed to special groups of actors nor were any conditions specified with regard to geographical limits or organisation of the region. The boundaries of regions were to be established by means of geographical and functional connections; entire federal states were expressly not considered as a region in the sense of InnoRegio.

Thus, the networks that were strived for joined different persons and facilities (see, for example, the portrayal of the BioMeT network in Ch. 2.2.1), with the aim of developing new technical, economical and social ways and means. For this purpose, existing obstacles to innovation were explored initially in order to identify approaches for their removal.

A prerequisite of qualifying for development was self-organisation of the regions. In this respect, the main incentives for the participants were:

- the image enhancement as an innovative region,
- the formation of strategic alliances in regionally important sectors of the economy, and
- a total development budget of approx. € 250 million.

InnoRegio is not a programme that is designed for long-term funding, rather it is intended to support self-sufficient local initiatives „on site“ (BMBF 2000). This means, that InnoRegio is understood as an impulse to use potentials for innovative ideas and concepts existing in the regions, and in this way to initiate and advance a positive regional development.

A total of 23 InnoRegio networks are being supported within the scope of the InnoRegio programme until the end of 2006, which have been selected in a two-stage process (see Fig. 10). In the „qualification phase“ (April to October 1999), interested regions were invited to apply to participate in the competition. Of the submitted 444 applications, a jury selected 25 initiatives (InnoRegios). These 25 InnoRegios were given the opportunity to expand their regional network structures and put their concepts in more concrete terms in the „development phase“ from November 1999 to October 2000. After that, the 25 InnoRegios, with their advanced development concepts, faced the jury once again. 23 InnoRegios were

able to convince the jury of their concepts. For the implementation of their concepts and projects they receive financial support in the amount of € 4 to 20 million. They represented a wide range of regional networks from privately owned entrepreneurial networks to publicly funded political networks.

Fig. 10: Phases of implementation of the programme InnoRegio



Source: BMBF 2005: 12

It should be emphasized that only the implementation of pre-competitive measures and projects is being supported within the scope of InnoRegio (see Development Guideline Section 2 Para. 4), i.e. projects

- for the exchange of information on innovation opportunities and profiling of the region,
- for the establishment and expansion of regional innovation networks and communication platforms,
- for attending to innovation processes in the region,
- for pre-competitive research and development for new products, production processes and services,
- for adapting of training and further education as well as the research profile to the special needs of the region,
- for the creation of concepts for the development of a personnel structure favourable to innovative processes in the industry, research and educational institutions in the region,
- for the development and implementation of a strategy for regional marketing, as well as
- for the development of innovative cooperation, transfer and communication models between businesses, educational and research institutions in the r.

Therefore, investment measures are not eligible for development, here, the InnoRegios must fall back on alternative funding opportunities.

The predominant part of projects (63 %) are funded by business enterprises. Institutes at universities and public research facilities process about 15 % respectively 8 % of the projects, while other institutions (associations, non-profit organizations) are responsible for 13 % (BMBF 2005: 6).

In summary – for network strategy in the Free State of Saxony as well as federal programmes for the development of innovation – it may be stated that a paradigm change

has been underway in the development policy in recent years. The focus of development policy is directed towards the establishment and development of (regional) networks. In these networks, actors from industry, educational and research institutions, politics, administration, associations as well as social partners are encouraged to join forces and work together in developing innovative development concepts. The prerequisites important for the generation of innovations, such as motivation, creativity and competence, are able to develop particularly well in close cooperation between widely different actors. Above all, the regional level is well suited for such mergers of actors, since they allow a quick and effective exchange of information as well as shared learning.

Another novelty of innovation development of a federal level is that the selection of regions to be developed takes places in a multi-stage process. This applies, by the way, to all five sub-programmes of the programme „Entrepreneurial Region“ – and, beyond that, is applied in similar fashion in programmes of other federal ministries, as well. Regions wishing to receive development funds must „apply“ presenting their concepts and convince a jury.

This competitive process has resulted in a paradigm change in German federal innovation development. No longer is each region or each initiative awarded development funds. Rather, there is a concentration on the most convincing concepts and the most successful regions. Even though this approach is quite successful and supported by experts, there is a risk, from a regional-political point of view, that individual regions may drift apart even further. It is apparent that certain regions are more successful than others in securing participation in these competitions. This depends, not least, on the existence of qualified actors who are best able to cope with the requirements of the competition.

### 3 Cooperation incentives and obstacles

University-industry cooperations are taking place in many different ways. Only a small section of university-industry cooperations in the Free State of Saxony could be dealt with within the scope of this study. In spite of this, it was attempted to convey an impression of the different forms and contents of the cooperations. The cooperation between science and business enterprises can be comparatively easy to grasp in individual cases. However, with a view towards their importance for regional development, only the larger cooperations are of interest, since these are expected to have a more significant impact on regional development. In the sense of a conclusion, we therefore would like to describe the essential incentives and obstacles for cooperations in the following.

The occasion for the cooperation between the industry and scientific and research institutions may have special reasons in individual cases. From a regional-political point of view, networks have been increasingly used as an instrument for some years. For this reason, the establishment and reinforcement of networks is being supported by the state. For this purpose, incentives for cooperation are offered. These incentives may be of a material or immaterial nature. Using the example of the BMBF initiative „Entrepreneurial Region“ it becomes clear that the establishment and development of regional networks is being supported with the aid of comparatively large financial expenditures (in excess of €5 million). Nevertheless, this support is viewed merely as start-up financing, from which self-supporting structures and cooperation are expected to emerge and exist in the long term. To what extent this will be the case in individual cases can only be assessed after the conclusion of the programme period.

Beyond financial funding, the competitions are also connected to immaterial incentives. Successful regions have the right to advertise with the titles they have been awarded, so that this equals receiving a special honour.

Cooperation incentives for business enterprises: for enterprises, a special incentive in university-industry cooperations consists of gaining direct access to new scientific and research results. On the one hand, enterprises may work towards having research activities implemented on subjects relevant to them and, on the other hand, they have direct access to the latest findings, which they may be able to integrate in new products or processes. This direct access to the latest research results can give enterprises a lead in knowledge and thus help in improving their competitiveness.

Cooperation incentives for universities: application oriented research is dependent on close contacts to the users of research results. This applies in particular to natural science and engineering research institutions. The reputation of a university or research facility depends, among other things, on the innovative content of its research results. For that reason, there is quite a large incentive in cooperating closely with enterprises, to ensure that there is a demand for research results. This, in turn is relevant for the acquisition of third party funds. Research groups are financially supported by the public as well as by private sponsors, insofar as there is a demand for the expected results. Not least, the acquisition of third party funds represents an important factor in the evaluation of universities, institutes and individual professorships. Especially in times of shrinking public budgets, engaged and innovative scientists will find it easier to hold their own.

Nevertheless, university-industry cooperations are facing obstacles, as well. These are found, first of all, in the shortage of existing capacities, from a personnel as well as financial point of view.

It was already pointed out elsewhere that the Saxon corporate structure is mainly characterized by small and medium-sized enterprises, which have only limited research and development resources at their disposal. Thus, as a matter of principle, they are dependent upon external know-how. However, especially the small enterprises do not have the practical wherewithal to engage themselves in extensive university-industry cooperations.

A comparable situation applies to professorships at universities. Some professorships are only endowed with limited human resources. In contrast to larger research facilities – public as well as private – they are at a disadvantage by having fewer human resources at their disposal. However, they are able to contribute their know-how in connection with other university institutes and research facilities.

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