Strategic Evaluation on Innovation and the Knowledge Based Economy in relation to the Structural and Cohesion Funds, for the programming period 2007-2013

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Executive Summary

As far as the innovation performance, measured on the basis of the standardised innovation indicator, is concerned, Germany is the only major EU country which belongs to the top group of innovators. However, transfer of research results into economic applications represents a major problem. This is also being reflected by mass unemployment and insufficient growth in the country. A second more future orientated issue is the increasing gap concerning human capital in the field of sciences and engineering.

Looking more into regional details (**section 2**) our analysis provided evidence for Germany still being divided more or less into two parts: the East and the West. With the regions in both parts are relatively similar: In West Germany the major regional types identified, are high and central techno and in East Germany aging academia.

The institutional policy background as well as the actual and recent innovation policy (**section 3**) do not sufficiently enough reflect the innovation divide in Germany. Although there is a huge bundle of specific innovation policy measures dedicated to problems of the new Länder, evaluators are missing a coherent and consistent strategy dealing with the problem of the innovation divide between the East and the West. To this end, the institutional policy framework does not seem to be conducive for national innovation strategies in the sense of a strategy for all Länder, for the new Länder or for the old Länder. National strategies concern actions of the Bund and Länder strategies concern policies of a respective Land only. Comprehensive approaches can hardly be identified (CSF for East Germany and Learning Region programme within Objective 3/1 (ESF) represent exceptions).

As far as ERDF is concerned, the institutional policy framework leads to the Länder level as being the most crucial power and decision maker. There is hardly any policy room for cross-Länder actions to be programmed although the current analysis revealed the need for those actions very clearly (e.g. a strategy towards the 3 per cent goal, or a qualification/education initiative focussing on the foreseen skill bottleneck in hard sciences).

Structural Funds interventions from 2000-2006 in Germany (**section 4**) were implemented through 20 Programmes from which 15 Programmes have a direct link to RTDI interventions. Given the German institutional context, these programmes with its RTDI measures are mainly implemented by the regional level (Länder). With regard to the regional distribution of RTDI resources one can state, that Objective 1 RTDI interventions are about three times higher than in Objective 2 regions. However, RTDI represents about eight percent in Objective 1 and nine percent in Objective 2 regions of total Structural Funds resources. Mostly they aim at the transfer of knowledge and the diffusion of technology to enterprises, the support to the creation and growth of innovative enterprises as well as at boosting applied research and product development.

The prospective analysis of the regional potential (**section 5**) for innovation again focussed on the two main regional blocks: the East and the West.

For West Germany the prospective SWOT was concentrating on the two main regional types (High techno and central techno). Important similarities (between the two types of regions) identified, were the poor technology transfer results and the prospective skill bottleneck in the high tech field. With regard to the R&D intensity there are punctually huge differences between the two types of regions. And within the high techno regions we have seen a concentration of 50 per cent of total R&D expenditures in only two Länder (Bayern and Baden Württemberg). Future threats were identified in the reduced role of basic research which can deteriorate the basis for future developments, and in the human capital deficit.

The SWOT analysis for East Germany highlights the severe socio-economic situation which goes hand in hand with a high unemployment rate and a strong brain drain in many areas of East Germany. As to RTDI one can state a low R&D intensity due to the lack of research capacities of huge firms. At the same time the university environment is relatively good and some areas of growth in new (e.g. biotechnology) and traditional (e.g. automotive) technological fields have emerged over the last years. For the future there is the threat that the innovation gap will feed the socio-economic divide, and that the brain drain will continue thus further weakening both the economic and the knowledge base of the East.

Concerning future priorities for Structural Funds support for innovation and knowledge (**section 6**) the evaluators formulated the following conclusions in relation to **strategic considerations**:

- Network approaches and clusters for innovation become more and more important in Objective 1 and 2 regions / priority for cluster and network support
- Support schemes for science-industry transfer are still of high importance in Objective 1 and 2 regions / from thinking the dream to more pragmatic approaches
- Create better links to FP 7 and CIP measures / more intelligent combination of FP and ERDF
- Demand for Revolving funds, seed capital / Set up alternative financial arrangements for innovative funding schemes
- Fragmented RTDI system in Germany provides room for coordination measures financed by ERDF / Overcome limited ERDF role in innovation policy by introducing nation wide initiatives

What **operational guidelines** for SF-RTDI interventions concerns, the evaluators formulated the following conclusions:

- Integration of private resources for co-financing projects under the EU-Structural Funds / use private resources as co-financing
- Administrative burden hampers efficient implementation / treat different things differently
- Enhancing SF management / setting up of SF innovation agencies

1 Introduction

In March 2000, the EU Heads of State and government launched an ambitious political initiative for the European Union to become "the most competitive, dynamic, knowledge-based economy by year 2010". The agenda, which has become known as the 'Lisbon Strategy', has included a broad range of policies and regulatory measures to achieve this goal.

At the 2005 Spring Council of European Union, Heads of State and government concluded that all appropriate national and Community resources, including those of Cohesion Policy, should be mobilised in order to renew the basis of Europe's competitiveness, increase its growth potential and its productivity and strengthen social cohesion, placing the main emphasis on knowledge, innovation and the optimisation of human capital. In short, the Council recognised that while some progress has been made since 2000 in moving towards the goals enshrined in the Lisbon Strategy there remains a need to create "a new partnership for growth and jobs"[1]

In launching the discussion on the priorities for the new generation of cohesion policy programmes, the Commission published on 6 July 2005 draft Community Strategic Guidelines entitled "Cohesion Policy in Support of Growth and Jobs: Community Strategic Guidelines, 2007-2013". One of the specific guideline is to improve the knowledge and innovation for growth. More specific areas of interventions, which are proposed by the Commission, include: improve and increase investment in RTD, facilitate innovation and promote entrepreneurship, promote the information society for all, and improve access to finance.[2]

Innovation is an important factor in releasing the potential of the Lisbon agenda. The knowledge captured in new technologies and processes can drive growth and competitiveness and create new jobs. But knowledge must be treated as part of a wider framework in which business grow and operate. Developing knowledge-based economy requires adequate levels of investment in R&D, education, and ICT as well as creating a favourable environment for innovation.

Less developed areas of the Union are also confronted with this new competitiveness challenge. Increasing cohesion leads to improvements in living standards and the reduction of economic and social disparities, which depend to an important extent on increases in productivity. Increasing competitiveness implies economic change through the introduction of new technologies and new methods of production as well as the development of new skills. Innovation is at the heart of this process. Technological and organisational change and new demands generated by rising income levels and factors which create new economic opportunities and therefore, contribute to the growth potential of these countries.

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[1] Communication to the Spring European Council (2005), "Working together for growth and jobs: A new start for the Lisbon Strategy", COM(2005) 141. Available at: http://www.europa.eu.int/growthandjobs/key/index_en.htm.

[2] Communication from the Commission (2005a), "Cohesion Policy in Support of Growth and Jobs: Community Strategic Guidelines, 2007-2013", COM(2005) 0299. Available at: http://www.europa.eu.int/comm/regional_policy/sources/docoffic/2007/osc/index_en.htm.

Structural Funds are the main Community instruments to promote economic and social cohesion. In the past and current programmes, they have contributed to enhance the research potential and innovation in businesses and to develop the information society, particularly in the less developed areas. Cohesion policy has also promoted the development of regional innovation strategies and other similar initiatives in the field of the information society.

The overall objective of the strategic evaluation study, as set out in the terms of reference, is that the study should provide conclusions and recommendations for the future of Structural Funds and Cohesion policy. In particular, the Strategic Evaluation will be used to prepare the negotiations with the Member States for 2007-13, to prepare the next operational programmes and to provide input into the 4th Economic and Social Cohesion Report.

In line with the tender specifications, this country report addresses the following issues:

- An analysis of the current situation in the field of innovation and the knowledge-based economy at national and regional level. For the national level, performance is compared to the average performance for the EU25 Member States plus Romania and Bulgaria; and at regional level, where possible given available statistics, compared to a typology of EU regions;
- Lessons from the past and current experience of implementing innovation and knowledge economy measures in the Structural Funds, both in terms of priorities and strategic approaches; as well as in terms of operational implementation;
- Main needs and potential for innovation in the eligible regions drawing on available studies, strategy development and future and foresight studies; and
- Recommendations on main investment priorities for Structural Funds over the programming period 2007-2013 and their implications for regional development.

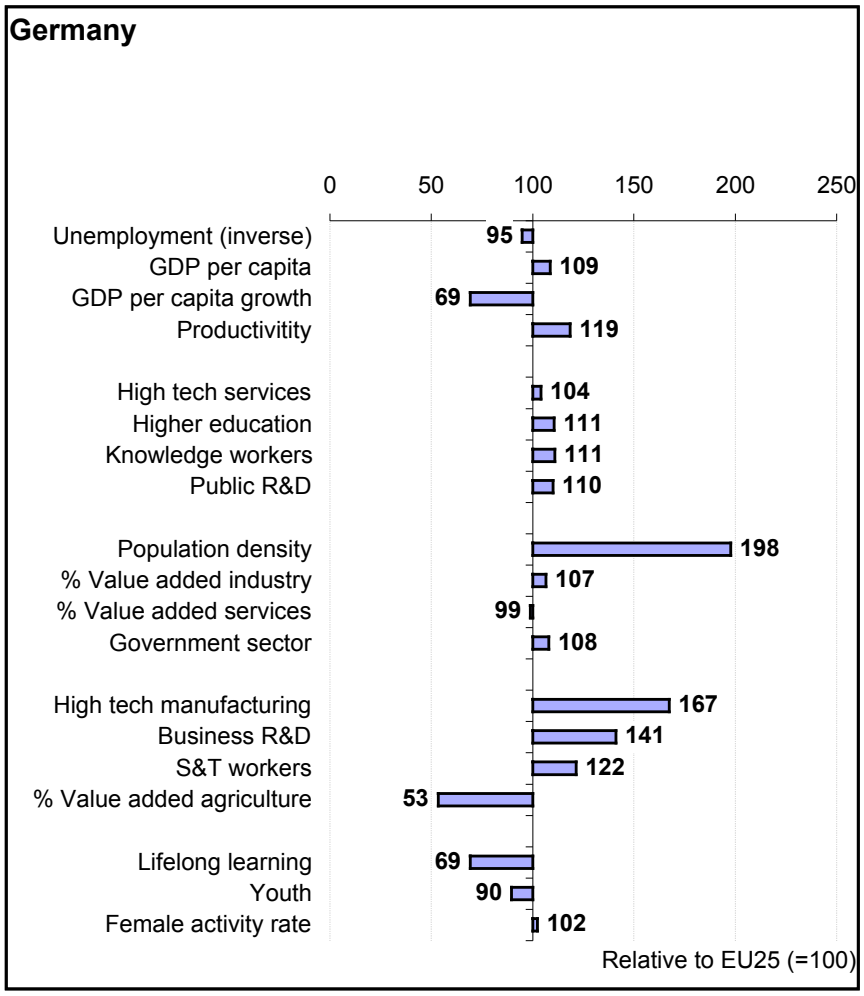
2 Investing in innovation and knowledge: a comparative overview of regional performance

This section provides a synthetic overview of the relative performance of the country, and where relevant main regions, with respect to the EU25 average for a number of selected key structural indicators of innovation and knowledge. The analysis aims to identify **main disparities and needs** at national, and wherever possible, regional level with a view to supporting the definition of priorities for future Structural Funds interventions (see sections 5 and 6 of this report).

2.1 Country overview: innovation and the knowledge economy

Exhibit 1 below provides a snapshot picture of the relative position of Germany compared to the EU-25 average for a series of key knowledge economy indicators.

Exhibit 1: Relative country performance for key knowledge economy indicators



Source: calculations of MERIT based on available Eurostat and national data from 2002-2003 depending on indicator. Detailed definitions and data for each indicator are provided in Appendix B.

Macro situation
Germany with its 82.5 million inhabitants is the major country in the European Union. Germany's GDP amounted to 2,178.20 bln EUR in 2004, representing more than 20 per cent of the respective EU-25 value.

At the same time however, the German economy, big though, still suffers from its insufficient performance. First and foremost to mention is the depressing level of unemployment. Unemployment rate reached estimated 11.8 per cent in 2005[3] and in 2006 11.6 percent are predicted. Looking at the standardised unemployment rate in the ILO definition which was the basis for exhibit 1, unemployment rate was 9.2 percent in 2004 and 9.3 per cent in 2005. Whereas in the average of 2002-2003 Germany ranked at 95 per cent of EU-25 average in terms of unemployment, the figures for 2004 increased to 102 (and even to 105 in 2005). Compared to other larger old Member States only France and Spain are facing unemployment problems of this magnitude. Unemployment thus still represents the overwhelming policy problem in Germany with impacts in various other fields of the economy and the society.

Very closely related to the labour market situation is the insufficient growth. Germany has still not been able to mobilise the growth factors in the economy, thus failing to become the economic motor of the enlarged Union. Although per capita GDP is well above European average, the economic growth is considerably below respective figures in most of the EU-25 States. Significant changes in this situation cannot be expected for the next twelve to 24 months, although very recent economic data provided by the Government show an unpredicted improvement.

What is also quite striking is the success of German industry on the world markets. Many firms can offer products which are competitive both in terms of technology and in terms of price. However, the economic impulse gained from the huge export surpluses did not trigger internal consumption.

As far as sectorial competencies are concerned, Germany is strong in the automotive industry, in electrical engineering and in chemicals, with the car industry being the motor for Germany's technical achievements and guaranteeing almost every third job in the country. Furthermore a good 1/3 of German industry's total RTDI expenditures are related to the automobile.

Emerging sectors with far less economic dominance are the environmental technology and renewable energy sources where German technology is leading in the world. Furthermore, for a couple of years now, Germany is ahead of its competitors in biotechnology and in nanotechnologies as well.

The structure of German firms is dominated by SMEs. More than 99 per cent of all companies are SMEs, which stand for almost 50 per cent of the gross value added in the country. The SMEs employ 70 per cent of all employees and they accomplish some 40 per cent of the turn over. [4]

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[3] In the German definition: Proportion of registered unemployed in per cent of total civilian workforce; see: SACHVERSTÄNDIGENRAT (2005), Jahresgutachten - Die Chance nutzen - Reformen mutig voranbringen", Berlin, p. 11.

[4] Data taken from IFM (2006), http://www.ifm-bonn.org/index.htm?/presse/fh-osnabrueck.htm

East-West divide
Germany's specific situation with regard to the macro indicators is still determined by the impact of the reunification. In 2005 Germany celebrated the 15th anniversary of its reunification and without doubt, the situation in the new Länder tremendously improved during this period. GDP per capita increased from 42.5 per cent of the West German average in 1991 to 67.1 percent in 2003.[5] Between 1991 and 2005 the new Länders' GDP actually doubled. However, there are still major challenges to overcome. The long lasting and sharp deindustrialisation process led to a crisis in the labour market with the abolition of millions of jobs in industry. Average unemployment rate in 2003 e.g. reached 18.5 per cent compared to 8.4 percent in the old Länder, although wages reached only some 81 per cent of the West German average in 2003. One clearly has to state that Germany currently has two labour markets, one in the new and one in the old Länder.

Innovation and Knowledge developments
Generally the Federal Government identified in its comments on the 2005 report on Germany's technological performance a "high level" of technological performance in the country. Five important points were relevant for the government's assessment:[6]

(1) German companies belong to the most innovative in Europe. Some 59 per cent of firms launched new products and new processes in 2003.
(2) Germany ranks high in international comparison with regard to knowledge intensity in industry.
(3) German firms account for 15.6 per cent of global trade in research intensive goods, ranking second only to the US.
(4) In R&D intensive sectors in Germany's production and employment is growing over averagely.
(5) Germany enjoys a rather high research intensity. Research budgets of both university and non-university research facilities grew by 3.1 per cent annually between 2000 and 2002.

Increasing Role of Industry
In 2003 combined public and private expenditure on R&D reached some 54.3 bln EUR or 2.55 per cent of GDP. German industry invested almost 36 bln EUR in R&D, representing 66 per cent of total R&D expenditures. Industry employed 307,000 researchers or 64 per cent of total research staff in Germany. Compared to the mid 1990s, industry's role in financing Germany's research systems significantly increased. In 1995 e.g., industry financed scarcely 60 per cent of R&D in Germany. The new and more important role of industry has led to the following major consequences:[7]

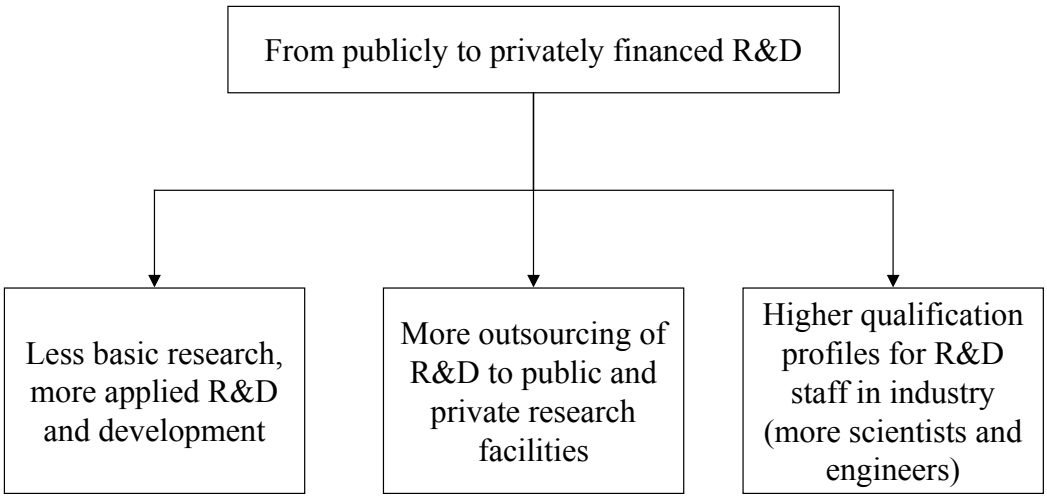
- A shift in emphasis from basic towards applied research and development. German industry allocates roughly 51 (44) per cent of its total R&D investment to

[5] See DEUTSCHER BUNDESTAG (2004), Jahresbericht der Bundesregierung zum Stand der Deutschen Einheit, Drucksache 15/3796, p. 79.
[6] See for the following: BMBF (2005), 2005 Report on Germany's Technological Performance – Main statements from the federal government's point of view.
[7] For this and the following see: BMBF (2004), Bundesbericht Forschung 2004, Bonn, Berlin, p. 475.

applied research (experimental development). Only five per cent are dedicated to basic research. Basic research is thus loosing importance in Germany.

- Industry increasingly out sources research tasks to third cooperation partners. This market is even much more dynamic than internal industrial R&D expenditures themselves. The proportion of this contract research has tripled within the last two decades and it amounted to 7.4 bln EUR in 2001.
- Qualification structure of R&D personnel has changed. Industry requires less and less staff at technician level and the demand for scientists and engineers is increasing. At the same time, the numbers of graduates in technical sciences is decreasing and, even worse, young school leavers are particularly reluctant to undertake studies in these subjects which will lead to severe bottlenecks in the future.

Figure 1: Consequences of increased share of industry financing for research in Germany



To finalise this overview section it should be stated that the analysis provided herewith is in-line with the 2004/05 trend chart policy analysis for Germany.[8] The reported general macro economic improvement has been stabilised recently whilst unemployment but also insufficient growth remain the most important problems. Anyhow, despite poor growth rates and high unemployment the knowledge-based sectors as well as the R&D intensive parts of the industry have been particularly successful. Also, Germany has been able to increase its R&D expenditures to 2.55 per cent of GDP. As a result, after years of relatively weak performance at the beginning of the 2000s, in 2005 Germany found itself as the only major Member State in the top group of leading countries with regard to the summary innovation index (SII). Moreover, together with Finland, Germany is the only EU country of which the SII trend is moving ahead.[9]

[8] EUROPEAN COMMISSION (no year), European Trend Chart on Innovation: Annual Innovation Policy Trends and Appraisal Report Germany, 2004-2005, available at: http://www.trendchart.org/tc_country_pages.cfm

[9] EUROPEAN COMMISSION (2005), European Trend Chart on Innovation: European Trend Chart on Innovation 2005, p. 11; available at: http://www.trendchart.org/tc_innovation_scoreboard.cfm

At the same time there remain major challenges at national level:

- More efforts are needed in order to reach the three per cent R&D expenditure goal, particularly with view to global competitors;
- Life long learning as well as the number of graduates in hard sciences need to be increased.

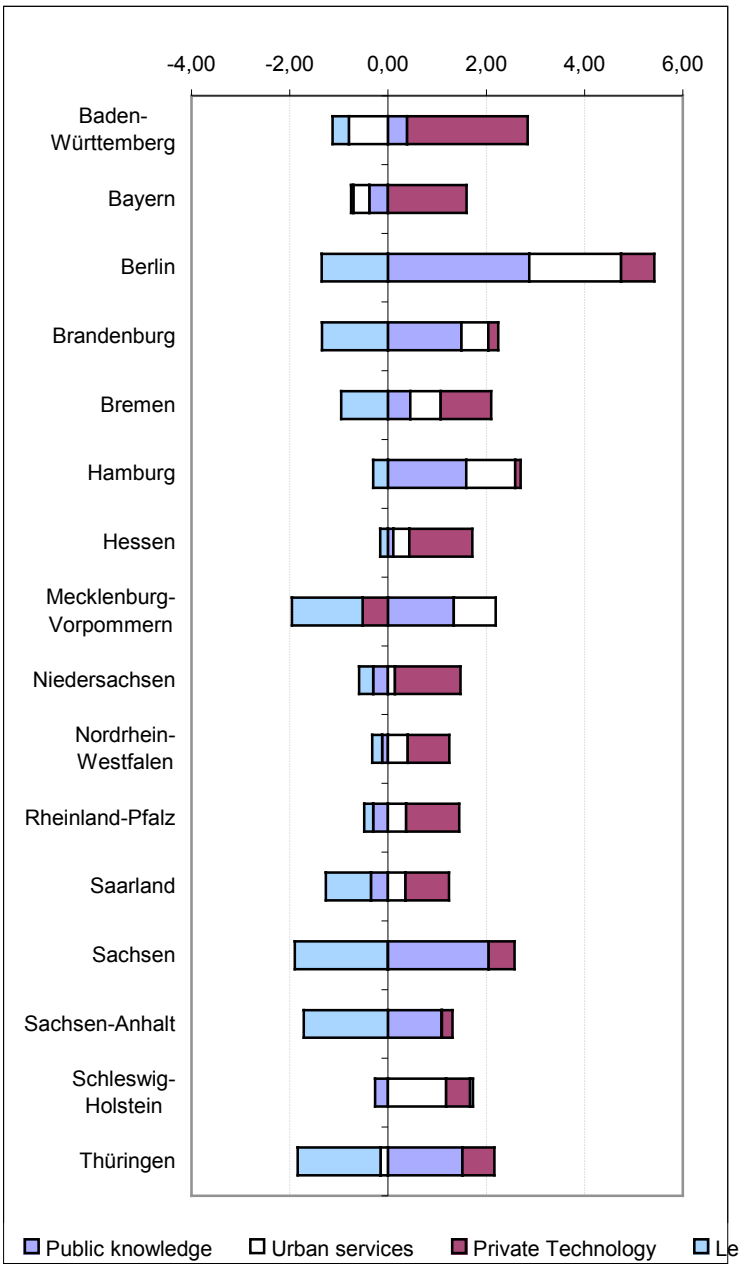
2.2 Regional disparities and recent trends

In order to analyse and describe the knowledge economies at regional level in the EU, the approach adopted was to reduce and condense all relevant statistical information available for a majority of regions. The approach involved firstly reducing the information from a list of selected variables into a small number of factors by means of factor analysis. These factors are:

- Public Knowledge (F1): human resources in science and technology combined with public R&D expenditures and employment in knowledge intensive services is the most important or common variables in this factor. Regions with large universities will rank high on this factor.
- Urban Services (F2): The most important variables for this factor are value-added share of services, employment in government administrations and population density. A key observation is that academic centres do not necessary co-locate with administration centres.
- Private Technology (F3) This factor is most strongly influenced by business R&D, occupation in S&T activities, and employment in high- and medium-high-tech manufacturing industries.
- Learning Families (F4). The most important variable in this factor is the share of the population below the age of 10. The Learning Families factor could also be interpreted as an institutional factor indicating a child-, learning- and participation- friendly environment, or even a 'knowledge-society-life-style' based on behavioural norms and values that are beneficial to a knowledge economy.

In a second step, the 200 plus EU27 regions were grouped into 11 types of regions (see appendix A) displaying similar characteristics by means of a cluster analysis.

Exhibit 2: Regional factor scores per Land



Source: MERIT. The bars are stapled factor-scores showing the deviation (1=standard deviation) per factor from the average of 215 EU regions (0.00). The longer the bar, the bigger is deviation. Detailed regional scorecards can be found in Appendix B.

* Indication of factor-score on Nuts 1 level of Lander is based on non-weighted average of Nuts 2 factor-scores

For Germany we have aggregated the regional NUTS 2 data in order to arrive at a Länder overview (see exhibit 2). The reason for that is two fold: (1) On the one hand by this approach we are simply reducing the number of regions under scrutiny (it is the 16 Länder now). (2) On the other hand, it is the Länder level (in addition to the federal level) which is endowed with a significant policy leverage (rather than the Bezirke (district) = NUTS 2). Also, Structural Funds interventions are being programmed and managed at Länder level and not from the districts.

Exhibit 3: Summary of regional typology at Länder level in Germany

Land	Number of NUTS 2 Regions in Land	Typology *	Prevailing Typology in Land
Baden-Württemberg	4	High Techno (4)	High Techno
Bayern	7	High Techno (7)	High Techno
Bremen	1	High Techno (1)	High Techno
Hamburg	1	Science and Service Centre (1)	Science and Service Centre
Schleswig-Holstein	1	Local Science and Services (1)	Local Science and Services
Hessen	3	➢ High Techno (1) ➢ Central Techno (2)	Central Techno
Niedersachsen	4	➢ High Techno (1) ➢ Central Techno (3)	Central Techno
Nordrhein-Westfalen	5	➢ High Techno (1) ➢ Central Techno (4)	Central Techno
Rheinland-Pfalz	3	➢ High Techno (1) ➢ Central Techno (2)	Central Techno
Saarland	1	High Techno (1)	High Techno
Berlin	1	Local Science and Services (1)	Local Science and Services
Brandenburg	1	Aging Academia (1)	Aging Academia
Sachsen	3	Aging Academia (3)	Aging Academia
Sachsen-Anhalt	3	Aging Academia (3)	Aging Academia
Mecklenburg Vorpommern	1	Aging Academia (1)	Aging Academia
Thüringen	1	Aging Academia (1)	Aging Academia

* Typology according to classification described in annex A. (n) = number of NUTS 2 regions in Land of a given type.

In the ten western Länder from Baden Württemberg to the Saarland there are in total 30 regions at the level of NUTS 2. Out of these 30 regions 17 belong to the High Techno group and eleven to the Central Techno group. Only Hamburg and the small Schleswig Holstein were classified differently: Science and Services Centre for the city state of Hamburg and Local Science & Services for Schleswig Holstein.

If we take a closer look, we see that even in the six old Länder with more than one NUTS 2 region, there is a very homogenous picture amongst the sub-regions. In Baden-Württemberg and Bayern we only find one type of region and in the other four Länder with more than one NUTS 2 region there are only two different types of regions to be identified: High Techno and Central Techno.

As a result, at the level of the ten Länder in the western part of Germany we see four Länder with the prevailing typology of High techno and four with the pre-dominant classification central technology whereby in the latter group of Länder we always find one high techno region. Hamburg is Science and Service Centre and Schleswig Holstein Local Science and Service. The large majority of the regions in West Germany were classified either as high or as central technology types. Within West Germany we can therefore hardly speak about disparities. It is more or less the same picture all over the place. We argue here, that the specific institutional and regional framework conditions for R&D and innovation policy, which we will discuss in more detail in the next chapter, are a main reason for that result. Germany's constitution demands to create similar working, living and societal conditions in all parts of the country. What we see from exhibit 3 is the result of that policy condition.

If we now look to the new Länder we see in principal a similar picture. We can identify ten NUTS 2 regions in the six Länder in the East (including Berlin). Nine out of these were classified as Aging Academia! Only Berlin is Local Science and Services and in all other new Länder we only find the type of Aging Academia. The new Länder (apart from Berlin) also represent a homogenous block – even more homogenous than the western Länder.

As far as disparities are concerned, the analysis shows that Germany still has to undergo a process of integration. We have argued in chapter 2.1 above that the national socio-economic data brought evidence for Germany still being divided into two separated parts: the East and the West. The analysis on innovation and knowledge economy data arrived at the same result. Both parts of Germany (East and West) are rather homogenous. But there are striking disparities between the East and the West.

- In the western Länder we find mostly the High Techno regions which are very strong in private technology and R&D investments. Additionally those regions have reached a high level of per capita GDP – also a general macro indicator for Germany. The second relevant typology to be identified in West Germany is the central techno cluster where we find in particular the old manufacturing regions with slightly under-averaged public knowledge scores. For both types of regions relatively low learning scores are significant. With regard to an ever increasing demand for highly skilled labour (in particular hard sciences) this will lead to skill "bottlenecks" in the near future.

- In the new Länder (apart from Berlin which consists of a "new" and an "old" part) we only find the aging academia cluster of regions. The high share of people with tertiary education represents a heritage of the communist system. The problem which became visible after the reunification was that the transition process led to a situation where the specific education and the specific knowledge of the people in the new Länder was no longer needed! There was a miss match between the human capital supply and the demand for skilled personnel. To date unemployment is very high, regional emigration leads to an aging population and life long learning scores are also weak as a result of relatively few children.

Obviously the classification between East and West as applicable and pragmatic it come, also simplifies reality. Of course we see in some spots in the East (e.g. Jena, Dresden) dynamics which are close to high techno regions. At the same time also in West Germany there are striking differences between some of the high techno regions (e.g. the one in the Saarland and the Stuttgart region in Baden Württemberg). However, from a strategic point of view, knowledge and innovation policy in Germany must take into account the described fundamental divide between the East and the West. That is the reason why we follow throughout the whole study this classification. Wherever necessary however, we will differentiate also between different regional types within our two major blocks. Also, we see the federal level as a potential new actor within ERDF interventions in the innovation domain.

Against the background of the East West divide there is a clear need for a coherent innovation and knowledge orientated strategy for the new Länder. Furthermore, the growing lack in scientifically skilled personnel in Germany generally also requires a strategic solution. ERDF might be a driver and a financial resource for both these points.

2.3 Conclusions: innovation and knowledge performance

We have seen in the discussion above that as far as key disparities with regard to innovation and knowledge performance are concerned, we have to differentiate between the two parts of Germany. There is no statistical evidence for differentiated policy actions at NUTS 2 level. That is also in line with the legal and institutional framework in Germany. The main policy actors in innovation and R&D – as we will see in the next chapter in more detail – are namely the federal level (the Bund) and the Länder.

Exhibit 4 below will thus focus both on the new and the old Länder as well as on the role of the federal level.

Exhibit 4: Summary of key disparities and needs per region

Region / group of regions	Key factors explaining disparity of performance (weaknesses)	Key needs in terms of innovation and the knowledge economy
West Germany (Old Länder)	• Key deficit overall is the weak learning score • Bottlenecks in scientists and engineers to be expected	• More efforts towards the 3 % goal; (industry share in R&D expenses is increasing) • Motivate school leavers to begin technical/science studies • Clearer view of the role of innovation and knowledge as driver for industrial structural change processes
East Germany (New Länder)	• Skill miss match • Weak learning performance • High unemployment and social polarisation hinders cooperation and learning	• Strengthen the R&D base • Improve the human capital endowment • More and better learning performance seems to be critical (**problem**: learning requires trust, and trust is decreasing with socio-economic disparities growing) => Need for a coherent innovation strategy for the new Länder
Federal Level	• Generally very good innovation performance *But* • More efforts towards the 3 % goal necessary • Skill bottlenecks *AND* • Divide between East and West	• See West Germany *AND* • The Bund can support/facilitate/impose an innovation strategy for the new Länder (and for Germany – more scientists!)

3 Innovation and knowledge: institutional context and policy mix at national and regional levels

Structural Funds support for innovation and knowledge is contingent on and seeks to strengthen the existing national (and/or regional) innovation system[10] in each Member State. In particular, institutional, legal and financial factors in the innovation system can limit the potential for certain types of intervention. Moreover, within the framework of the EU's "Lisbon objectives", Structural Funds interventions are expected to complement and provide added value to national (or regional) policy framework. In some Member States, Structural Funds interventions in favour of innovation and knowledge are marginal with respect to the national investment and policy effort, in others Structural Funds provide a main source of funding for such interventions. In both cases, there is a need to identify relevant national and EU policies which can have an impact on decisions on funding priorities.

3.1 Institutional and legal framework for innovation and the knowledge economy

This section of the report appraises two broad factors that condition the potential for coordinated intervention of EU and national (regional) policies in favour of innovation and knowledge:

- The first concerns the organisational structures of public and semi-public bodies responsible for the design, implementation and monitoring of innovation and knowledge economy policies. In particular, the analysis considers the responsibilities for funding or managing specific types of measures liable to be considered for support under the Structural Funds;
- The second concerns the institutional, legal and financial frameworks, which condition the linkage of national (regional) financing with EU financing.

In Germany research and innovation policy has a constitutional anchor according to which research and the support for research activities represents a common duty for both the state and the society. There is a wide consensus in society and government that a powerful research and innovation system in Germany would need to have an adequate financial framework. In Germany's federal state system, the public part of the financing combines contributions from both the Länder and the federal government. For example, the university operations are being financed for the most part by the Länder whereas investments in buildings are being borne by the Länder and the federal level (Bund). The system of combined financing (from the Länder and the Bund) of so-called common tasks (Gemeinschaftsaufgaben), found not only in the R&D system, has come under criticism in the recent years as it requires often immense coordination efforts which often reduce efficiency. Also, political responsibility for decisions is rather in-transparent in this environment. The federal

[10] The network of organisations, individuals and institutions, located within or active within national or regional boundaries, that determine and shape the generation, diffusion and use of technology and other knowledge, which, in turn, explain the pattern, pace and rate of innovation and the economic success of innovation.

government and the Länder have therefore in March 2006 introduced a reform agenda under the header "Förderalismusreform" which aims at overcoming the mentioned deficits.

As a result of the current federal system and the at least 16 plus 1 players, the German research system's organisational structure is rather complex, if not to say fragmented. In order to provide an overview, we try to highlight below main policy as well as main research actors.

Policy level
At federal level the main players are the Federal Ministry for Education and Research (BMBF) and the Federal Ministry of Economic Affairs (BMWi). In addition come other Ministries which play a minor but significant role in R&D, for example the Defence Ministry. Structural Funds interventions in the field of KBE and innovation for the most part are not being programmed and managed under the auspices of the Bund. An exception is the "learning region" initiative which was co-financed under the ESF.

At the level of the 16 Länder we also find at least two relevant policy institutions in each Land (Ministry of Research and Ministry of Economic Affairs). At the same time, the Länder are the main actors for Structural Funds interventions in Germany.

The administrative communication platform for co-ordination of all activities is the Bund-Länder commission for R&D. At legislative level the federal parliament (Bundestag) and the assembly of the Länder in Berlin (Bundesrat) cooperate on the basis of the constitutional regulations and in cases of conflict a mediation committee (Vermittlungsausschuss) is being installed.

The Bund and the Länder have installed together Science Council (Wissenschaftsrat) which provides consultancy services to the policy actors in the Länder and at federal level.

Research actors
The universities represent the backbone of the German research system. They train the future researchers and conduct own research works, in line with the German model of researching and teaching unified under one umbrella. The basic funding for the universities comes from the budgets of the Länder in which a given university is located. The university sector is the major recipient of public support in the German R&D system. In addition to that, the universities receive financial resources through contract research for industry, and from national research funding programmes (e.g. from the Ministry (BMBF) or from the Deutsche Forschungsgemeinschaft (DFG[11])) as well as from international financers (e.g. EU via the R&D framework programmes).

A second pillar which is to mention here is composed by the non-university research facilities, such as:

[11] The DFG is an administrative body of the German universities and other publicly financed research institutes and it delivers research funding to its members. The funds the DFG is allocating are being provided by the Bund and the Länder.

- The Max Planck Gesellschaft (MPG) which focuses on basic research; some 90 per cent of their budget is donated in the framework of institutional funding (not related to specific projects). In 2004 the planned public funding for MPG amounted to 965 MEUR, partly financed by the federal level and the Länder. Currently the MPG runs 77 institutes.
- The Helmholtzgemeinschaft (HGF) which affiliates 15 big research centres. The HGF provides important and expensive equipment and infrastructure to national and international researchers. The centres are being financed by the Bund and the Länder. Planned budget for 2003 was 1,308 MEUR (app. 58 per cent coming from the Bund). Here again, some 90 per cent of the budget is donated in the framework of institutional funding (not related to specific projects).
- The Fraunhofer Gesellschaft (FhG) executes applied research. Only 40 per cent of the FhG's budget stems from the basic institutional funding. For 2004 a public budget of 419 MEUR was foreseen, of which 83 per cent were committed by the federal level. Currently the FhG runs 58 research centres.
- The 80 research institutes which are grouped in the Leipniz Gemeinschaft (WGL). Those institutes are rather different in their (research) profile. Within the WGL we find R&D service organisations like the information centre in Karlsruhe (Fachinformationszentrum Karlsruhe), the German mining museum but also specific research institutes. All organisations within the WGL are partly financed (50:50) by the federal level and the Länder.

Others

A particular group in the German R&D system represent the programme managing agencies (Projektträger). These managing and delivery agencies of federal funding schemes are hosted by main research institutions (very often, but not always those from the Helmholtzgemeinschaft). The Projektträger DLR (Deutsches Zentrum für Luft- und Raumfahrt) is an example for this. The DLR is a major research institute in the field of aviation and space while the Projektträger within the DLR is e.g. delivering amongst others the health research programme of the BMBF.

On behalf of the relevant Ministry, the Projektträger agencies market the programmes, they assist proposers, they assess the proposals and they prepare the administrative decisions. Generally, the delivery agencies of national programmes also act as national contact points for the European framework programmes in their specific thematic fields.

Exhibit 5: Main organisations per policy area

	Type of organisation	
Policy objectives	**National (&/or regional) public authorities and agencies**	**Key private or non-profit organisations**
Improving governance of innovation and knowledge policies	**National** • BMBF, BMWI **Länder** (regional) • Länder Ministries	• Stifterverband der Deutschen Wissenschaft • Political Foundations
Innovation friendly environment	**National** • BMBF, BMWI **Länder** (regional) • Länder Ministries	• Stifterverband der Deutschen Wissenschaft • Political Foundations, private foundations
Knowledge transfer and technology diffusion to enterprises	**National** • BMBF, BMWI, FhG **Länder** (regional) • Länder Ministries	• Technology transfer offices at the universities • Patent marketing agencies (Patent-Verwertungsagenturen) • regional technology transfer institutions (e.g. NATI in Niedersachsen, BTI Sachsen, ZENIT NRW)
Innovation poles and clusters	**National** • BMBF, Kompetenznetze.de **Länder** (regional) • Länder Ministries	• Initiative: Kompetenznetze.de, • regional technology transfer institutions
Support to creation and growth of innovative enterprises	**National** • BMBF, BMWI **Länder** (regional) • Länder Ministries	• KfW, Kreditanstalt für Wiederaufbau • State Banks in the Länder (L-Bank, NRW bank etc.) • Chambers
Boosting applied research and product development	**National** • BMBF, BMWI, FhG **Länder** (regional) • Länder Ministries	• regional technology transfer institutions

Source: Study team based on national/regional policy documents, TrendChart reports, OECD reports, etc. See appendix C for a detailed definition of the policy categories.

3.2 Policy mix assessment

This section provides a summary overview and analysis of the national and regional policy mix in favour of innovation and knowledge in which the Structural Funds interventions take place. The analysis is conducted with respect to six broad categories of objectives of innovation and knowledge policies (see appendix C for an explanation of each category).

Measures identified per category of the policy objectives are then further sub-divided in terms of the direct beneficiaries of funding (or legislative) action. To simplify, the report adopts three broad types of organisation as targets of policy intervention:

- Policies supporting academic and non-profit knowledge creating institutions;
- Policies supporting intermediary/bridging organisations involved in innovation support, technology transfer, innovation finance, etc.;
- Policies supporting directly innovation activities in private sector.

The matrix below summarises the current policy mix at national level presented above. A simplified coding system is used with intensity of support (financial or political priority) for different policy areas and targets indicated by a colour coding system.

Exhibit 6: Policy mix for innovation and knowledge

	Target of policy action		
Policy objectives	**Academic /non-profit knowledge institutions**	**Intermediaries/bridging organisations**	**Private enterprises**
Improving governance capacity of innovation and knowledge policies			
Innovation friendly environment			
Knowledge transfer and technology diffusion to enterprises			
Innovation poles and clusters			
Support to creation and growth of innovative enterprises			
Boosting applied research and product development			

Legend

Top policy priority
Secondary priority
Low priority

Source: Calculations of study team based on national/regional policy documents, TrendChart reports, OECD reports, etc.

Main Issues of Innovation Policy Agenda
Germany's overwhelming policy objective is to generate more economic growth and to support the creation of new income and employment opportunities in order to overcome mass unemployment. There is widespread consensus in all democratic parties and in the society that innovation is the key this.

At the same time, the political class in Germany is well aware of the fact that innovation cannot be enforced by administrative directives. Innovation takes place in a communicative process between research, industry and the public sector. The creation of framework conditions supportive to this innovative milieu represents thus a key policy objective for the federal government in Berlin. To this end, the government has called-in for a 'Council for innovation and growth' which will assemble industry, unions, academia and policy. This initiative aims at improving the German innovation system at all levels.[12]

In addition to that, three major policy actions should be mentioned:

(1) The **High Tech Strategy** which will be launched in the summer of 2006 and which will focus particularly on both key and horizontal cross-cutting technologies; some six bln EUR will be made available for this programme;
(2) The **excellence initiative** awarding outstanding research performance and global reputation and
(3) The **information society programme** launched in march 2006; a key component of which is the extension of the broad band infrastructure in Germany. Further more the federal government also plans to organise an ICT summit which may take place in the fall of 2006.

Finally, a key topic on the reform agenda in Germany is the definition of new roles, responsibilities and rules between the Bund and the Länder within the country's federal system (Föderalismusreform).

New role of regions in innovation policy
Traditionally in Germany innovation and research policy from the BMBF was either focussing on a specific research theme or on a firm. Since the mid 1990s a new dimension was added: the region, whereby "region" can be any sub national territory either in administrative or functional definition. A region is thus a Land or a district or the Ruhrgebiet (Ruhr area) or similar.

The BioRegio initiative was the first one of these regional programmes. It aims at stimulating start-ups, at locating foreign companies, at accelerating growth in existing biotech companies and at promoting the offer of sufficient seed and venture. This activity was followed by other initiatives like learning regions (promoting cooperative actions in order to support lifelong learning), EXIST (regional strategies to support university start ups) and InnoRegio which promoted innovation and networking in regions of the new Länder.

[12] The chancellor has announced in march 2006 that the council will begin to be active in early summer 2006.

Today the regional dimension is well covered in the innovation policy of the Bund and besides the pure technological orientation and the enterprise focus it represents a third pillar in the country's innovation policy mix.

Summary of policy actions
Within this sub-paragraph we are going to highlight the activities within our broad categories (see exhibit 6).

Improving governance capacities for innovation and knowledge policies: This category has primary importance in Germany both at federal and at Länder level:

At federal level the analysis on the technological competitiveness and the setting up of the Science council, amongst others should be mentioned here as evidence for the efforts Germany is conducting in this field. Also, generally, the Ministries take on board external expertise before launching new programmes or initiatives.

At Länder level the situation is less transparent. However, an increased openness of Länder governments towards evaluations of e.g. Structural Funds' interventions can also be taken as a proof for the Länder attempting to increase their knowledge base for policy formulation and implementation. In addition to that, the use of foresight (e.g. Bayern 2010) and the application of the European innovation scoreboard at Länder level (Nordrhein-Westfalen) also show that the Länder apply up-to-date tools and techniques in order to improve decision making.

Innovation friendly environment. With regard to regulations the new government continues the old government's aim to reduce red tape for SMEs and for innovative start ups. Also, the Förderalismusreform can be regarded as a major step towards improving an innovation friendly environment. The Länder also have intensified their actions in order to clean up regulations and to reduce administrative burden to necessary levels.

Risk capital is an issue in Germany. Therefore both he Länder and the Bund try to mobilise resources for risk funding. The Bund for example tries to mobilise (private) venture financing within the BioRegio initiative and with other specific instruments like the equity capital programme BTU. In the Länder we can identify similar actions in other technology fields, sometimes co-financed by Structural Funds. At Länder level Bayern has a very diversified system which combines seed, risk and equity capital programmes from the Bund and the EIB with sources from the Land.

Human capital has been identified as a major bottleneck for future research and innovation in Germany. Governments are conscious of the problem and there are many interesting initiatives running in order to increase pupils'/students' interest in technology issues. The Zukunftsinitiative Innovation (future initiative "Innovation") in Nordrhein-Westfalen for example brings technology to the schools, it promotes studies in engineering and hard sciences and it attempts to fascinate children for technological aspects in every day life.

To summarise, this category has top priority in Germany.

Knowledge transfer and diffusion to enterprises stands in the centre of measures of the Federal Ministry of Economic Affairs and of the Länder. There is general belief that technology transfer is key for innovation. The universities run contact offices in order to facilitate cooperation with industry, the Bund finances agencies which market intellectual properties and the Länder are also executing specific technology transfer schemes.

Bremen for example has concentrated all technology transfer activities in one agency (BIA). Specific transfer activities are programmes to support start ups from university graduates, trainings for students interested in starting up a business and others. Rheinland-Pfalz also specifically supports technology transfer to SMEs with a bundle of measures, including e.g. a special personnel transfer programme which finances the transfer from young graduates to firms in the frame of innovation orientated projects. Another example in this Land is a technology orientated consultancy support scheme.

This category also can be assessed as top priority. However, as seen above, results are still limited.

Measures to support innovation poles and clusters represent also a top priority policy field in Germany. At federal level both the Ministry of Economic Affairs and the BMBF are active in this field. The support for both regional/local competence centres and supra-regional networks of competencies has increased tremendously. In almost all important technology fields, networks and centres have been financed. Project selection usually was based on competitive calls. A marketing and communication platform for the German networks is offered through the internet portal www.kompetenznetze.de .

The Länder have also increasingly shifted their policies towards innovation poles and networks. The national policy lines as well as the growing importance of clusters in European policies has opened the door for this development. The ERDF (including its innovative actions) plays a growing role in this policy category at Länder level. In Nordrhein-Westfalen e.g. clusters will represent a major topic within the 2007-2013 Objective 2 programme.

Support to the creation and growth of innovative enterprises: The federal government regards innovative small firms and start-up as important catalysts to transfer Germany's export orientation to a more domestic base. As far as start ups are concerned the programme EXIST is to be mentioned. With this scheme the government attempts to improve general conditions for technology orientated spin-offs from universities. Currently projects in 15 model regions are running and work is underway to develop this programme further. Other activities are the equity capital programme (BTU), credit lines within ERP (European Recovery Programme) innovation programme facility as well as specific support actions for young firms in the new Länder.

At Länder level there is a wide range of different activities which are often integrated in the Structural Funds programmes. An interesting case is the PFAU programme in Nordrhein-Westfalen which supports young graduates starting up their own firm. The programme offers to the entrepreneurs a 50% post at the university, so that they have a certain financial backing. Additionally, the new firms receive a cheque which can

be used to finance consultancy services and they can participate in specific training courses.

This policy also has top to secondary priority in Germany.
Finally, measures boosting applied research and product development. An important tool in this category at the level of the Bund is the ProInno programme which finances technological development amongst SMEs or between SMEs and research institutions. The financial resources provided for the new ProInno II programme will increase significantly to some 106 MEUR in 2006.

Similar programmes are to be found in the Länder as well. Generally the evaluators see secondary to top priority for this policy in Germany.

Towards the three per cent goal
The political class in Germany as well as major parts of the society regard innovation as The driver for more growth and more jobs. Currently (2003) Germany is investing 2.55 % of GDP in R&D. The new federal government has announced an increase of the budget for the BMBF in 2006 by 5.6 % or more than 8 bln EUR. Also, Chancellor Merkel confirmed the policy goal of investing 3 per cent of GDP in R&D by 2010.

Public expenditure, however, represents only 1/3 of total R&D expenditures from which the federal level finances only 33 per cent. The absolute impact of the Bund is thus limited. At least the announcement of the government is a psychological signal. It is not clear whether Germany can manage to meet the Barcelona goal of 3 %. What is clear however is, that in order to reach the target strong efforts from both the public sector and the industry are necessary.

3.3 Conclusions: the national innovation system and policy mix

The policy framework for innovation policy in Germany has historically grown, but our analysis has clearly shown that the system contains all necessary actors and policy actions in order to base Germany's economic development more on innovation and knowledge. As a result, Germany is currently performing very well in the summary innovation index (SII).

The policy measures identified cover a wide range of different approaches, goals and instruments. One can say, that almost any innovation policy instrument discussed by scientists or practitioners during the last 15 years or so can be found in Germany's policy portfolio either in the Bund or at Länder level. What is lacking however, is a consistent strategy orientation. The 16 plus one system seems to be a hindrance factor for joint strategic and comprehensive innovation strategies. Also the federal system as such, with its shared responsibilities and joint financing between the Bund and the Länder has come under criticism.

Regarding Structural Funds the Länder have the main political powers for programming and implementation. There is no national ERDF innovation/KBE programme in place nor is there any joint national strategy on how to exploit Structural Funds to further develop Germany's R&D and innovation system towards

the Lisbon/Barcelona goals, nor is there any national ERDF co-financed initiative focussing on horizontal issues in the KBE/innovation domain, e.g. the skill bottleneck which must be regarded as a major problem for the future of Germany's innovation performance.

Exhibit 7 provides examples of possible opportunities for actions to be funded under the European Structural Funds, in order to support these necessary evolutions. This point will be fully elaborated in section 6.

Exhibit 7: Key opportunities and constraints for investment by the Structural Funds

Policy objectives	Opportunities for Community funding (national priorities)	Constraints or bottlenecks (factors limiting Community funding)
Improving governance of innovation and knowledge policies	• Involvement of Innovation Agencies for the management of innovation funding schemes and the realisation of strategic activities of regional importance (e.g. regional foresight exercises)	• Institutional fragmentation hampers smooth implementation • EU financial regulation impedes innovative projects which would need more flexibility
Innovation friendly environment	• Introduction of cross-cutting innovation actions which combine various innovation aspects (technological and social innovation) • "New" innovation financing schemes (e.g. revolving funds, seed capital)	• Institutional fragmentation • The lack of operating innovation related rating systems for projects hampers the optimal selection of innovative projects
Knowledge transfer and technology diffusion to enterprises	• Networks of technology diffusion providers	• Financing of network structures under discussion • Partly supply-side orientated
Innovation poles and clusters	• Supporting innovation poles, venture capital and revolving funds for poles	• Danger of concentration on existing and strong poles/clusters rather than on latent ones in important growing sectors • Problem of self-financing after funding
Support to creation and growth of innovative enterprises	• High potential for start-ups from universities and polytechnics • Support to local approaches addressing promising technological fields	• Reluctance of SMEs towards the implementation of Innovation Management Tools • Lack of management know-how to run growing companies
Boosting applied research and product development	• Support to integrated concepts which involve academic and business orientated research ("competence centre" approach)	• Lack of "business orientation" of academic side • Reluctance to co-operate

4 Structural Funds interventions to boost innovation and create a knowledge economy: 2000-2006

This section of the reports provides an analysis of the patterns of Structural Funds expenditures in the fields of innovation and knowledge-based economy during the current programming period (2000-2006 for EU-15 or 2004-2006 for the new Member States). It examines the patterns from both a strategic point of view (the policy mix pursued by the Structural Funds programmes) and at an operational level (consumption of funds, management of innovation measures, indications of relative effectiveness of measures, case studies of 'good' practice).

4.1 Strategic framework for Structural Funds support to innovation and knowledge

4.1.1 Strategic approach to innovation & knowledge in Structural Funds programmes

Structural Funds in Germany are implemented through 20 Programmes of which 15 have a direct link to RTDI interventions. To ensure a legible and synthetic overview of the strategic approach in Germany the main RTDI resources allocations with its measures will be highlighted in the following. By this we ensure a balance between RTDI measures

- in rural areas (including former Objective 5b regions) like Rheinland-Pfalz (Objective 2),
- in regions which suffer from industrial change like Nordrhein-Westfalen (Objective 2) and
- in regions which suffer from de-industrialisation under specific local conditions like Bremen (Objective 2).

In addition, the overall strategic approach on RTDI for Eastern Germany as it is stated in the CSF will be taken into account while evaluating the RTDI measures in Objective 1 regions.

We start with the **Objective 2** interventions in Germany which will be exemplified by the Objective 2 intervention in Nordrhein-Westfalen, Rheinland-Pfalz and Bremen. The strategic approach to Objective 2 interventions on RTDI is reflected by each Regional Programme in Western Germany.

The Objective 2 Programme of **Nordrhein-Westfalen** allocates the most resources to RTDI measures in comparison to other Objective 2 Programmes in Germany (see exhibit 8). RTDI activities in the current programme are realised by measures 2.1 (Technology and Innovation), 2.5 (Media and Communication), 2.8 (Energy) and 3.3 (Technology- and Qualification infrastructure). A cross cutting topic is the support to networks within measure 2.1 (Technology and Innovation), 2.5 (Media and Communication) and 2.8 (Energy).

The overall aim of the Objective 2 interventions in **Rheinland-Pfalz** is the improvement of the regional economic development and by this the creation and safeguarding of jobs. Moreover, the regional technology potential should be upgraded. Notably Objective 2-Measures 3.1, 3.3 and 3.4 are of importance in this respect. About 22.4 % (38.23 MEUR) of Objective 2-resources are allocated to RTDI measures.

The Objective 2 programme in **Bremen** has a special focus on RTDI due to its cross cutting character with implications for the whole Objective 2 region. More concretely, RTDI measures are implemented through measures 2.1 (Information Society), 2.2 (Technology Transfer) and 3.1 (Support to demand oriented environmental technologies).

In conclusion the qualitative RTDI approach in Objective 2 regions in question aims at i) "boosting applied research and product development" and ii) "supporting the creation and growth of innovative enterprises". Concerning the first category main instruments are "pre-competitive development" as well as "industrial research projects and related infrastructure". An exception is the aid scheme "Future Contest" in Nordrhein-Westfalen which supports the collaboration and the knowledge transfer between science and industry (see also chapter 4.1.2 and appendix D.2). Generally speaking, public sector, universities and industry belong to the target group of these instruments.

Concerning the second category ("supporting the creation and growth of innovative enterprises") various instruments are supporting the implementation: infrastructures and facilities, using existing BIC structures, aid schemes. Due to its broader intervention scope one can identify a more differentiated approach in comparison to the first category (see also chapter 4.1.2 and appendix D.2).

In conclusion, Objective 2 programmes follow diversified approaches, whereas infrastructure still plays an important role (see also chapter 4.1.2 and appendix D.2).

Turning to **Objective 1**, we recall that regions will be outlined in the frame of this strategic evaluation by reflecting the general approach laid down in the Community Support Framework (CSF). The Community Support Framework forms the basis for the Structural Funds Intervention (Objective 1) in Eastern Germany. The strategic approach for each Regional Operational Programme refers to this overall document. In the following this overall approach will be described in more detail.[13]

The overall aims of Objective 1 interventions are i) pursuing the social cohesion process through sustainable economic growth, ii) increasing the employment rate and iii) reducing the unemployment rate. The implementation is realised through six regional multi-funds programmes and three mono-funds programmes for the inter-regional implementation. The CSF formulates the following priorities with relation to RTDI measures for the regional and inter-regional programmes:

[13] See GEFRA (2003), Halbzeitbewertung des Gemeinschaftlichen Förderkonzeptes 2000-2006 (GFK) für den Einsatz der Strukturfonds in den neuen Bundesländern und im Ostteil Berlins, p. 27 ff.

- **Priority 1**: Enhancing the competitiveness of the economy, particularly SMEs (support to the technological and innovative potential in SMEs)
- **Priority 2**: Infrastructure (upgrading science and R&D infrastructures, information society; upgrading further education infrastructure)

On the one hand certain measures are divided in "operations" and "actions", whereas different activities are supported under the same heading in various regional programmes. On the other hand, some technological fields are relevant to all regional programmes, such as environmental technologies, micro technologies, food and bio technologies.[14]

The degree of implementation of these priorities differs from Land to Land:

- Measure 1.2 (support to the technological and innovative potential in SMEs): high support for R&D measures in Berlin and Sachsen, low support in Brandenburg and Mecklenburg-Vorpommern.
- Measure 2.2 (upgrading science and R&D infrastructures, information society): high support in Mecklenburg-Vorpommern.
- Measure 2.3 (upgrading further education infrastructure): high support in Sachsen-Anhalt, Berlin and Brandenburg.

In contrast to objective 2 interventions, objective 1 measures focus more on upgrading infrastructures and facilities, what instruments concerns. Policy areas in the front are: "boosting applied research and product development" as well "as knowledge transfer and technology diffusion to enterprises". Obviously the catching-up process with regard to infrastructures in the Eastern part of Germany is not completed (see also chapter 4.1.2 and appendix D.2).

The calculations presented below in the two exhibits are based on the allocation of Structural Funds budgets following the intervention code classification. For practical purposes, the calculation of financial resources allocated to innovation and knowledge has been limited to the RTDI codes:

- 181 Research projects based in universities and research institutes
- 182 Innovation and technology transfers, establishment of networks and partnerships between businesses and/or research institutes
- 183 RTDI Infrastructure
- 184 Training for researchers

Additional calculations based on broader definitions of innovation are presented in Appendix D.

[14] See ibid, p. 103.

Exhibit 8: Overall allocation of resources at an objective 1 and 2 level (planned figures in Euro)

Objective	Total cost	SF			NF	
		Total	ERDF	ESF	Public	Private
RTDI INTERVENTIONS						
Objective 1	2.684.339.994,30	1.713.644.292,78	1.713.644.292,78	0,00	970.695.701,52	0,00
Objective 2	884.791.231,30	413.585.080,65	413.585.080,65	0,00	453.558.961,65	17.647.189,00
TOTAL COHESION POLICY						
Objective 1	33.838.455.223,00	21.466.713.600,00	11.897.273.381,00	6.035.876.494,00	12.164.324.744,00	207.416.879,00
Objective 2	9.742.474.663,00	3.784.986.005,00	3.269.686.230,00	515.299.775,00	3.950.151.257,00	2.007.337.401,00

Source: programming documents and financial data provided by DG REGIO

The total allocation for RTDI is estimated at 2,684.3 MEUR in Objective 1 regions and 884.8 MEUR in Objective 2 regions. By this, Objective 1 RTDI interventions are about three times higher than in Objective 2 regions. However, RTDI represents about 8% in Objective 1 and 9% in Objective 2 regions of total Structural Funds resources.

Exhibit 9: Regional allocation of resources (Euro)

Programs	RTDI INTERVENTIONS			TOTAL		
	Total SF	ERDF	ESF	Total SF	ERDF	ESF
OBJECTIVE 1						
PO OBJ 1 BERLIN (OST)	41.316.890,00	41.316.890,00	0,00	716.991.000,00	519.537.000,00	190.135.000,00
PO OBJ 1 MECKLENBURG-VORPOMMERN	78.276.440,38	78.276.440,38	0,00	2.562.311.144,00	1.250.245.344,00	638.370.000,00
PO OBJ 1 SACHSEN-ANHALT	322.899.312,40	322.899.312,40	0,00	3.500.445.500,00	1.991.342.291,00	746.254.000,00
PO OBJ 1 THURINGEN	296.071.900,00	296.071.900,00	0,00	3.011.136.800,00	1.566.290.432,00	882.700.000,00
PO obj. Sachsen	752.193.755,00	752.193.755,00	0,00	5.070.610.000,00	3.269.598.314,00	1.098.190.494,00
PO OBJ1 BRANDENBURG	222.885.995,00	222.885.995,00	0,00	3.090.222.000,00	1.639.260.000,00	730.660.000,00
OBJECTIVE 2						
DOCUP obj. 2 Baden-Württemberg	0,00	0,00	0,00	102.070.000,00	102.070.000,00	0,00
DOCUP obj. 2 Bayern	24.971.821,00	24.971.821,00	0,00	560.458.000,00	499.624.351,00	60.833.649,00
DOCUP obj. 2 Berlin	34.614.000,00	34.614.000,00	0,00	401.289.000,00	246.426.000,00	154.863.000,00
DOCUP obj. 2 Bremen	22.766.123,00	22.766.123,00	0,00	117.962.000,00	117.962.000,00	0,00
DOCUP obj. 2 Hessen	5.138.297,00	5.138.297,00	0,00	191.555.000,00	191.555.000,00	0,00
DOCUP obj. 2 Niedersachsen	61.249.220,00	61.249.220,00	0,00	766.019.000,00	712.020.000,00	53.999.000,00
DOCUP obj. 2 Nordrhein-Westfalen	197.160.451,65	197.160.451,65	0,00	1.012.824.995,00	859.683.777,00	153.141.218,00
DOCUP obj. 2 Rheiland-Pfalz	42.140.568,00	42.140.568,00	0,00	178.198.000,00	165.861.000,00	12.337.000,00
DOCUP obj. 2 Schleswig-Holstein	12.000.000,00	12.000.000,00	0,00	269.595.000,00	231.472.092,00	38.122.908,00
Hamburg	0,00	0,00	0,00	6.448.010,00	6.448.010,00	0,00
Saarland	13.544.600,00	13.544.600,00	0,00	178.567.000,00	136.564.000,00	42.003.000,00
Total Regional OPs	**2.127.229.373,43**	**2.127.229.373,43**	**0,00**	**21.736.702.449,00**	**13.505.959.611,00**	**4.801.609.269,00**
OBJECTIVE 1						
Bundesprogramm	0,00	0,00	0,00	1.749.567.000,00	0,00	1.749.567.000,00
PO obj. 1 Pêche	0,00	0,00	0,00	104.430.156,00	0,00	0,00
PO obj. 1 Transport	0,00	0,00	0,00	1.661.000.000,00	1.661.000.000,00	0,00
Total Multiregional OPs	**0,00**	**0,00**	**0,00**	**3.514.997.156,00**	**1.661.000.000,00**	**1.749.567.000,00**

Source: programming documents and financial data provided by DG REGIO

Although the figures above present an impressive picture of SF resources one has to acknowledge that RTDI measures only represent a small part of the SF interventions. Further more, in the context of 54 bln EUR for total R&D expenditures in Germany the influence of ERDF funded RTDI interventions is limited. However, the ERDF can play a co-ordinating role and can enhance the quality of RTDI measures in Germany. In this respect SF measures interact with the ERDF innovative action scheme and the RIS, RIS+ and RISI initiatives. With regard to the overall European strategic guidelines (Lisbon-Strategy, Barcelona objective) and the challenges in Germany (pointed out in chapter 2, see also chapter 5) analysed SF funded RTDI measures play an important role in quality terms and (again) a more supporting role in quantative terms.

4.1.2 Specific measures in favour of innovation and knowledge.

As pointed out in chapter 4.1.1 main policy areas for SF interventions with regard to RTDI are:

- boosting applied research and product development,
- support to creation and growth of innovative enterprises play as well as
- knowledge transfer and technology diffusion to enterprises

In general, resources available for these measures and their intervention scope reflect the needs analysed in chapter 2 and are coherent with the policy framework described in chapter 3.

Exceptions which do not reflect the policy framework directly are:

- SF intervention in favour of innovation poles and clusters: Here, national funded measures to support innovation poles and clusters represent a top priority policy field in Germany. At federal level both the Ministry of Economic Affairs and the BMBF are active in this field. In almost all important technology fields, networks and centres were financed. In contrast to that, only few – and recently introduced – corresponding SF measures can be identified. Examples are "Learning Regions" programme (ESF financed), MST.factory/dortmund-project, BIOZ Dresden and the introduction of cluster related-activities in the health sector in 2003 in NRW.[15]
- Innovation friendly environment: This is also of top priority in Germany and targets at revamping regulations, financing and human resources. SF measures were not identified under the programmes in question.

[15] See Ministerium für Wirtschaft und Arbeit des Landes Nordrhein-Westfalen (2003), Ziel 2 Programm, Jährlicher Durchführungsbericht für das Jahr 2003, p. 63

Exhibit 10: Key innovation & knowledge measures

Policy area	Number of identified measures (all programmes)	Approximate share of total funding for innovation & knowledge measures	Types of measures funded (possibly indicating importance)
Improving governance of innovation and knowledge policies	-	-	-
Innovation friendly environment	-	-	-
Knowledge transfer and technology diffusion to enterprises	4	30.1 %	Technology transfer centres/measures, erection and upgrading of technological and educational infrastructures
Innovation poles and clusters	1	0.2 %	Enhanced capacity and trigger of inter-institutional learning processes
Support to creation and growth of innovative enterprises	4	27.5 %	Direct support to companies; support to environmental technologies, entrepreneurship; using BIC network
Boosting applied research and product development	5	41.7 %	Aid scheme of competitive character; funding of "Pre-competitive development" and "Industrial research" projects and related infrastructure.

Nb: this table is a summary of the table in appendix D.2. The total of the percentage share per policy area may sum to more than 100 since certain measures fall into several categories.

4.2 Learning from experience: the Structural Funds and innovation since 2000

4.2.1 Management and coordination of innovation & knowledge measures

This section reviews the overall management of Structural Funds interventions in favour of innovation and knowledge during the current period. It examines the coherence of the role of key organisations or partnerships in implementing Structural Funds measures for innovation and knowledge, the linkages between Structural Funds interventions and other Community policies (e.g. the RTD Framework Programme) and the financial absorption and additionally of the funds allocated to innovation and knowledge.

Given the German institutional context, RTDI measures within the Structural Funds are mainly implemented by the regional level (Länder). With regard to the Objective 2 and 1 interventions in Germany the Federal Ministry of Finance (BMF) and the Federal Ministry of Economic Affairs (BMWi) are involved in the overall programming and the regional zoning of eligible areas in partnership with the regions.[16] RTDI measures are not directly implemented by the federal level. Hence, heterogeneity of approaches which reflects the regional situation can be stated.

One exception in terms of direct implementation of innovation and knowledge measures through the federal level in Germany is the innovation programme "Learning Regions" which is co-funded by the ESF and is administered by the Federal Ministry of Education and Research (BMBF). It is implemented by PT-DLR (Projektträger des Deutschen Zentrums für Luft- und Raumfahrt). The programme is implemented through the ESF Objective 3 programme in West-Germany and throughout the Federal Operational Programme "Human Resources" in East-Germany and crosses common RTDI code classifications due to its holistic approach (see 4.2.2).

The overall implementation approach at **regional level** (Länder) in Germany (Objective 1 and 2 regions) is characterised by the use of existing administrative structures for the implementation of RTDI measures. This has advantages and disadvantages at the same time. While the use of existing structures ensures a smooth implementation in formal terms this procedure is very complex due to the formal obligation to involve and consult many bodies that might be affected. In addition, further bodies like banks or technology agencies are involved for the realisation of RTDI measures. An example for this implementation mode is the approach in Rheinland-Pfalz, which will be briefly explained as an example in the following.

In general, RTDI measures in **Rheinland-Pfalz** are implemented via existing public administrative structures: The Ministry in charge of ERDF interventions is the Ministry for Economic Affairs, Transport, Agriculture and Winegrowing (MWVLW).

[16] See GEFRA (2003), Halbzeitbewertung des Gemeinschaftlichen Förderkonzeptes 2000-2006 (GFK) für den Einsatz der Strukturfonds in den neuen Bundesländern und im Ostteil Berlins, p. 370 ff.

The Investitions- und Strukturbank Rheinland-Pfalz (ISB) acts as intermediary body for the overall financial implementation of the Objective 2 interventions. With respect to RTDI measure 3.4 the ISB acts also as delivering agency (like a "Projektträger"); i.e. project proposals are being collected as well as evaluated by the ISB. The implementation of this measure is characterised by a low absorption rate. Other RTDI measures are implemented by the overall Objective 2 management body within the MWVLW and the units responsible for the RTDI measure in question. Here we can find a measure with a low and one with a high absorption rate.

In contrast to this general approach in Germany – which was exemplified by describing the Rheinland-Pfalz case – **Nordrhein-Westfalen** set up an "Objective 2 secretariat" as technical assistance body for the overall implementation of the Objective 2 programme. The secretariat – identified via a public tender procedure - supports the Managing Authority in the management of Objective 2 resources. However, the Objective 2 secretariat also acts within a complex regional administrative structure. In total 38 departments or units as well as 10 intermediary bodies are involved in the implementation of the Objective 2 programme.[17] With regard to RTDI measures, several agencies are directly or indirectly involved in the implementation. In that respect the Projekt Ruhr GmbH acts as co-ordinating body for cluster related activities in the regions.[18] Furthermore, agencies like ZENIT GmbH are implementing projects of RTDI character (for example "Future Contest" for the Ruhr area).

Exhibit 11: Absorption capacity of innovation & knowledge measures

OBJECTIVES	ALLOCATED	DISBURSED TOTAL SF	EXPENDITURE CAPACITY
Objective 1	1.713.644.292,78	914.600.157,17	53,4%
Objective 2	413.585.080,65	184.943.248,83	44,7%

Provided by ISMERI.

The absorption of Structural Funds resources in Objective 2 regions is almost 10 percentage points lower than in the Objective 1 regions. While the overall economic situation in Germany influences the absorption of Structural Funds, the lower absorption rate in Objective 2 regions might be explained by the overall assistance rate of only 50 per cent and the lack of capital from the Länder and other public institutions for co-financing Objective 2 projects. Also, Objective 1 regions are characterised by a high proportion of infrastructure orientated measures. These activities generally can be financially better controlled than softer RTDI measures, which are found to a larger extent in Objective 2 programmes as pointed out in chapter 4.1.1.

In addition, European and national rules for the financial implementation became tightened which led to bureaucracy and problems for co-financing projects[19]. At the

[17] See IAT (2003), Halbzeitbewertung des Ziel 2-Programms 2000-2006 des Landes Nordrhein-Westfalen – Abschlussbericht –, 2003, p. 316

[18] See MR GESELLSCHAFT FÜR REGIONALBERATUNG (2005), Aktualisierung der Halbzeitbewertung des Ziel 2-Programms 2000 bis 2006 des Landes Nordrhein-Westfalen, Materialband, Gutachten für das Ministerium für Wirtschaft, Mittelstand und Energie, November 2005, p. 73.

[19] For example eligibility of staff costs, how to handle profit orientated infrastructures, payments only on basis of real paid costs.

same time innovation and knowledge policies at European level have a cross-cutting impact and include a number of policy areas. Hence, RTDI measures in Objective 1 and 2 regions represent an integrated part of a complex EU, national and regional policy and funding scheme with synergies but also with patterns of competition.

Exhibit 11a proves that RTDI infrastructure measures in Objective 1 regions are still of importance due to their good absorption rate in comparison to the situation in Objective 2 regions, where since the 80s RTDI infrastructure was upgraded (realisation of technology centres, universities, …). The crucial point here is not the setting up of new infrastructures but the demand-orientated adjustment of these infrastructures, which is still an ongoing task. Exhibit 11a also shows that research projects in universities and research institutes are – in Objective 1 as well as in Objective 2 regions – characterised by a low absorption rate. It might be that other funding schemes like FP6 are more important for these beneficiaries because they are more targeted at the "scientific community". Exhibit 11a also shows the almost average absorption rate for technology transfer matters as well as for the co-operation between universities and industry. With respect to the latter aspect (co-operation university/industry) overall problems that might affect the absorption rate are:

- time consuming procedures within universities,
- lack of ability to handle projects within universities (project management),
- lack of industry oriented activities within universities,
- reluctance to co-operate from the business side.

With regard to the measures aiming at innovation in companies reasons for a low resp. declining absorption rate are:

- reserved investment and innovation climate of companies
- missing willingness of banks to co-finance innovative companies (lack of appropriate rating systems)
- bureaucracy in handing in proposal and realising funding projects

Exhibit 11a: Absorption capacity of innovation & knowledge measures per intervention code

CODES	ALLOCATED	DISBURSED	EXPENDITURE CAPACITY
OBJECTIVE 1			
181 - Research projects based in universities and research institutes	521.260.330,90	248.753.886,98	47,7%
182 - Innovation and technology transfers, establishment of networks and partnerships between businesses and/or research institutes	834.764.651,39	460.354.975,86	55,1%
183 - RTDI infrastructure	357.619.310,49	205.491.294,33	57,5%
TOTAL OBJ. 1	**1.713.644.292,78**	**914.600.157,17**	**53,4%**
OBJECTIVE 2			
181 - Research projects based in universities and research institutes	52.455.388,50	23.382.618,10	44,6%
182 - Innovation and technology transfers, establishment of networks and partnerships between businesses and/or research institutes	164.270.401,80	73.971.727,32	45,0%
183 - RTDI infrastructure	196.859.290,35	87.588.903,41	44,5%
TOTAL OBJ. 2	**413.585.080,65**	**184.943.248,83**	**44,7%**

Provided by ISMERI

As a result of differentiated absorption rates, funds have been shifted between measures during the implementation phase, which will be exemplified in the following:

Nordrhein-Westfalen:

- Introduction of cluster related-activities in the health sector in NRW in 2003 (new measure 2.1.1)
- Increasing resources in measures 2.8 "new energies" and 2.9 regional development concepts.[20]

Rheinland-Pfalz:

- Shifting resources to phasing-out regions within priority 1 (business and tourism related infrastructure)
- Shifting resources from measure 3.4 (supporting the innovative potential of young enterprises) to measure 3.3 for the further development of the research and technology infrastructure[21]

Bremen:

- Shifting resources from measure 1.1 financial support to SMEs to 1.2 innovative start-ups (536.813 EUR)
- Allocating resources of the performance reserve to priority 3 (environmental protection) [22]

In **East-Germany** the problematic economic situation results in missing co-financing means aiming at enhancing the RTDI capacity in SMEs. As a result of this, resources have been shifted to risk capital measures or will be dedicated to investments in R&D infrastructure, like in Berlin.[23]

In conclusion, the allocation of resources was adjusted to the regional developments and the demand side. Main elements setting the scene for adjustments have been outlined above (socio-economic situation, reserved investment climate, tightened financial regulations, lack of co-financing means).

4.2.2 Effects and added value of Structural Funds support for innovation and knowledge

This section of the report analyses the effects and added value of the Structural Funds interventions in favour of innovation and knowledge during the current programming period. The analysis is based on two main sources, namely: a) available evaluation reports or studies concerning Structural Funds interventions; b) interviews and additional research carried out for this study. Accordingly, this section does not pretend to provide an exhaustive overview of the effects or added value[24] of

[20] See Ministerium für Wirtschaft und Arbeit des Landes Nordrhein-Westfalen (2003), Ziel 2 Programm, Jährlicher Durchführungsbericht für das Jahr 2003, p. 63

[21] Information do reflect the suggestions of the Mid-Term-Evaluation, see isoplan/ism (2003), Halbzeitbewertung des Ziel 2-Programms Rheinland-Pfalz 2000 – 2006, Endbericht 3. November 2003 p. 130ff.

[22] See Der Senator für Wirtschaft und Häfen (2005), Ziel 2 – Jährlicher Durchführungsbericht für das Jahr 2004, p. 47.

[23] Information do reflect the suggestions of the Mid-Term-Evaluation, see prognos (2005), Aktualisierung der Halbzeitbewertung des Operationellen Programms (Ziel 1) des Landes Berlin 2000 – 2006, p. 11.

[24] A good definition is "The economic and non-economic benefit derived from conducting interventions at the Community level rather than at the regional and/or national level". See

Structural Funds interventions but rather is based on the examination of a limited number of cases of good practice. These good practice cases may concern the influence of the Structural Funds on innovation and knowledge economy policies (introduction of new approaches, influence on policy development, etc.), integration of Structural Funds with national policy priorities, promoting innovative approaches to delivery (partnerships), or measures which have had a particularly important impact in terms of boosting innovation potential, jobs and growth.

In earlier sections it had been explained that the need for transfer schemes (science/industry) and the upgrading of the technological infrastructure remain major tasks for Structural Funds intervention. In addition, in more general terms one can conclude that:

- Due to the problematic economic situation the absorption of Structural Funds is declining. In particular RTDI measures which often bear risks are affected.
- The lack of co-financing impedes the absorption of funds in Objective 1 and 2 regions. A good practice to overcome this problem is the budget line in the regional budget for co-financing the Objective 2 programme in NRW. By this budget line the Land adds up to 20 percent of the eligible costs, so that an intervention rate of about 70 per cent can be reached, depending on the project content/type.
- RTDI measures in Objective 1 and 2 regions are in competition with other national or European programmes like FP6, which offer several advantages in terms of administration and scope (e.g. flexibility in handling, concentration of research excellence). Furthermore, FP6 projects mainly take place outside objective 2 areas resp. less developed areas in objective 1 regions and hence increases regional disparities. A better linking of FP and SF RTDI measures is overdue and inevitable!
- The administrative fragmentation hampers a smooth implementation. The set up of flexible implementation bodies (like the Objective 2 secretariat in NRW) is rare.
- The evaluation of projects and their approval or disapproval is still time consuming in particular when it is done within the Ministries.
- The regional zoning for Objective 2 interventions hinders the use of the full regional RTDI potential.

In more detail, "traditional" measures (classic direct SME support, technological infrastructures) are characterised by a good absorption/impact as stated below. Measures with a low impact are targeting areas such as environment, information society and media (see exhibit 13). Furthermore employment effects in high tech sectors in rural areas such as Rheinland-Pfalz are lower than expected due to a lack of projects.[25]

In financial terms it was explained earlier that the overall absorption rate highlighted by the figures in chapter 4.1.2 is relatively satisfactory. But, due to the problematic economic situation the absorption of SF is declining.

Evaluation of the Added Value and Costs of the European Structural Funds in the UK. December 2003. (Available at : www.dti.gov.uk/europe/structural.html)

[25] See isoplan/ism (2003), Halbzeitbewertung des Ziel 2-Programms Rheinland-Pfalz 2000 – 2006, Endbericht 3. November 2003, p. 60.

Network approaches (or clusters) for innovation become more and more important in Objective 1 and 2 regions because networks offer a wide range of advantages to involve enterprises and institutions (e.g. better integration in value chains, optimising of transaction costs, upgrading of knowledge, …). In this context the demand orientated upgrading of RTDI infrastructure becomes important, whereas the focused intervention on a technological field of growth in a region should be pursued. To valorise this RTDI infrastructure, support schemes for science-industry transfer are still of high importance in Objective 1 and 2 regions and are able to speed up the rate and scope of innovation at regional level. These measures among others should be considered for further expansion of support. Further opportunities for Community funding such as introduction of cross-cutting innovative actions, integration of technology transfer networks and support to star-ups from universities and polytechnics are analysed in chapter 3.3.

In the following, selected good practices related to the key findings elaborated above will be described. Here, we give an overview on some good practices, while in Appendix E the Learning regions and the MST.factory case will be analysed in more detail.

*In earlier sections it was explained that RTDI activities within the Structural Funds interventions are implemented only by the Länder. In this respect "**Learning Regions**" is an exception because of its German-wide implementation approach. Furthermore it integrates economic and social innovation aspects in one integrated funding scheme and by this increases the innovation capacity in the regions in Germany. Although the programme is funded by the ESF it succeed in initiating regional networks for innovation.*

*In contrast to this German-wide approach, **MST.factory** stands for an ambitious activity in the field of micro technologies as integral part of a local cluster initiative in Dortmund that succeeded in enhancing regional competitiveness. The rational behind MST.factory is to provide the necessary technological infrastructure for start-ups and innovative enterprises which are purchased on the companies' demand. After installation of the infrastructure companies can rent the equipment. By this, companies have a sound financially base and are able to demonstrate to financiers that they have access to the necessary equipment for a product development project on a "low cost basis". From a higher-ranking angle, it has to be mentioned that cluster approaches like the dortmund-project sometimes go hand in hand with exclusion effects. A closer look shows, besides the growing sectors in Dortmund, a remaining high rate of unemployment in the city. A future task for RTDI interventions under the SF can be seen in overcoming – or at least minmising - these polarisation effects.*

*The so-called **Future Contest** for the Ruhr area (Zukunftswettbewerb Ruhrgebiet) in Nordrhein-Westfalen aims at boosting applied research and product development by supporting science/industry co-operations via an aid scheme that is based on a contest in the Ruhr area; an area that suffers severely from industrial structural change. SF intervention created added value with regard to the exploitation of the regional science and industry potential. In particular for regions lagging behind this intervention type is of great importance during the catching-up process.*

*The **biotechnology approach** in Sachsen heads for similar aims, but applies different instruments. Central to this approach are the setting up of the innovation centres BIOZ Dresden and BIO CITY Leipzig.[26] While Leipzig is focused on bio-medicine, Dresden focuses on the interface of material sciences on the one hand and medical technologies and biotechnology on the other hand.[27] Both centres are financed by ERDF measure 2.1. Through these centres the co-operation between university research and industry can be initiated and upgraded. The centres are integral part of a regional biotechnology initiative named "bio saxony", which aims at the overall co-ordination of biotechnology projects in Sachsen.[28]*

[26] See www.bioz-dresden.de, www.bio-city-leipzig.de
[27] See http://www.sachsen.de/de/wu/smwa/wirtschaft/europa/strukturfonds/efre/beispiele/
[28] See http://www.biosaxony.de.

4.3 Conclusions: Structural Funds interventions in favour of innovation and knowledge

As outlined in chapter 4.1.1, SF intervention in Objective 2 regions in question mainly focus on "boosting applied research and product development" as well as on "supporting the creation and growth of innovative enterprises". Objective 1 measures also focus on "boosting applied research and product development" and in addition on "knowledge transfer and technology diffusion to enterprises". In general, the upgrading of infrastructures and facilities to accomplish these approaches is of higher importance in objective 1 than in objective 2 regions. Obviously the catching-up process with regard to infrastructures in the Eastern part of Germany hasn't been completed yet (see also chapter 4.1.2 and appendix D.2).

As exhibit 12 indicates, mainly infrastructure measures are characterised by a good absorption rate and implementation. As analysed above (see chapter 4.2.1) "softer" RTDI measures as well as measures aiming at supporting innovation in SMEs are characterised by a weaker performance. Concerning the latter, companies are hesitating to start innovative projects which are linked to risks under the given socio-economic framework conditions. The entrepreneurial basis for such approaches gets smaller. In this respect, infrastructure projects like the MST.factory (see chapter 4.2.2) is a good example that shows how to overcome this situation.

The MST.factory case highlighted at the same time the "polarisation dilemma" which can be intensified by SF intervention. Polarisation effects are displayed by growing sectors, on the one hand, and exclusion and stable high unemployment rates, on the other hand. SF interventions supporting innovative poles in weak regions can support these developments. A future task for RTDI interventions under the SF can be seen in overcoming – or at least minimizing - these polarisation effects.

Exhibit 12: Main outcomes of innovation and knowledge measures

Programme or measure	Capability	Added value
Nordrhein-Westfalen		
Measure 2.1 (supporting the co-operation between science and industry, in particular Future Contest)	Good absorption	Exploiting science and industry potential; initiating clusters ("fields of competences")
2.5 Media and Communication	Low absorption capacity	Enhanced capacity and trigger of inter-institutional learning processes
3.3 Technology- and Qualification infrastructure (in particular MST factory)	Good absorption	Accompanying science-business transfer; provision of a high-level technological infrastructure; initiating cluster development
Rheinland-Pfalz		
Measure 3.1: Innovation and start-up initiative Westpfalz	Low absorption capacity	Supporting entrepreneurship
Measure: 3.3 Upgrading applied research and technology infrastructure	Good absorption	Enhancing applied research and product development
Measure 3.4 Support to innovative enterprises active in growth markets	Low absorption capacity	Enhancing companies' competitiveness
Bremen		
Measure 2.1 (Information Society; in particular BIBIS – Bremerhavener Institut für Biologische Informationssysteme am TTZ)	Low absorption capacity	Enhancing companies' competitiveness in the field of biotechnology
Measure 2.2 (Technology Transfer)	Good absorption	Upgrading of technology transfer bodies, diversification of regional economical potential
Measure 3.1 (Support to demand oriented Environmental Technologies)	Low absorption capacity	Development of demand driven and innovative environmental techniques in SMEs – by this enhancing the regional environmental situation.
Objective 1*		
Measure 1.2 (support to the technological and innovative potential in SMEs)	Good absorption	Enhancing innovation in SMEs by initiating research co-operation, technological and marketing advise, exploitation of patents, for example.
Measure 2.2 (upgrading science and R&D infrastructures, information society): high support in Mecklenburg-Vorpommern.	Good absorption	Better R&D infrastructure through investive measures in technical equipment and erection of buildings for technology transfer activities for example.
Measure 2.3. (upgrading further education infrastructure): high support in Sachsen-Anhalt, Berlin and Brandenburg.	Good absorption	Better knowledge infrastructure through investive measures in ICT and erection of buildings for educational training, for example.

* Due to the high degree of abstraction that is laid down in the CSF for Objective 1, measures pursue various objectives/strategies. Effectiveness → significant results achieved; good absorption and management performance, etc. Added value of measures → reinforcement of national priorities, innovative approaches and solutions, institution building, etc.

5 Regional potential for innovation: a prospective analysis

This section of the report seeks to summarise and draw conclusions from the analysis of the preceding sections, available studies and interviews and focus groups carried out for this study in order to provide an analysis of the regional innovation potential. In doing so, the aim is to provide a framework for orientations in terms of future Structural Funds investments in innovation and knowledge.

5.1 Factors influencing regional innovation potential

The analysis so far has shown that the key regional disparity with regard to innovation and knowledge can be made out between the East and the West. Both parts of the country come as rather coherent blocks, while at the same time both parts differing significantly from each other. A detailed analysis on this was provided under 2.2.

The summarising reflections we are providing in the current chapter thus very much focus on the two major parts of Germany. In addition to that we also go into detail in selected Länder.

5.1.1 West Germany

Germany generally belongs to the top group of innovative countries in Europe. This situation is being significantly influenced by the old Länder in the west. At the same time however, general macro indicators are insufficient (we have mentioned the unemployment and growth problem). The focus group discussion on that issue (good innovation performance on the one and unfavourable socio-economic situation on the other hand) unveiled as the first key deficit for the western (and eastern) Länder in the framework of innovation, the aspect of transfer! What we can say is that framework conditions for R&D and innovation are comparably well established. It has been argued in the focus group that the reason for the weak economic exploitation of the good innovation endowment lies in poor technology transfer activities.

At the same time we also have pointed out above that there is a wide range of different technology transfer activities in place in the western Länder. As far as evaluators are concerned, the problem lies a bit in an over-ambiguous attitude of the policy makers. What we mean by this is, that in the Länder the vision of technology transfer is dominated by the university-industry (or best: SME) interface. Of course this is the most difficult transfer to get organised. A much broader transfer definition might be a way to overcome this problem.

Human capital is a second issue influencing the regional innovation potential. Universities and universities of applied sciences produce less and less graduates in hard sciences while industry's demand for researchers and engineers is increasing. At the same time universities are rather crowded which makes studying more difficult.

Looking also to investment in R&D, we see that in 2003 87 per cent of total R&D investments took place in the western Länder. Within the group of the western Länder

Bayern and Baden-Württemberg, the two plain Länder of the High Techno group, stay for 50 per cent of the R&D investment in the west.[29] In both of the two Länder R&D investment in per cent of GDP was above the three per cent goal in 2003 (Bayern: 3.05 and Baden Württemberg: 3.81). We thus see a relative concentration of R&D expenditures in two Länder which at the same time enjoy relative favourable economic framework conditions.

In the major Land within the Central techno Group (NRW) we have to report rather low R&D expenditures (1.80 per cent of GDP).[30] What is remarkable is the decreasing knowledge intensity in this region between 1993 and 2003 by 0.11 percentage points. In the western Länder only in Rheinland Pfalz (-0.39) and Schleswig Holstein (-1.17 per cent) we saw higher levels of "de-knowledgisation" in that period.

Hamburg as a city state enjoys high scores of public knowledge and urban service factors. R&D intensive manufacturing firms are lacking. As a result R&D investment in per cent of GDP also only reached 1.87 per cent in 2003. However, due to the airbus industrial installations Hamburg enjoyed a tremendous increase in regional research intensity between 1993 and 2003 by 3.18 percentage points.

As far as sectors are concerned West Germany was and still is strong in the car industry, in mechanical engineering, in electrical engineering and in chemicals. With the car industry becoming more and more important for West Germany and Germany as a whole. It is an open secret that the car industry is the trigger for technological developments in Germany. It stimulates technological innovations in various other industries like electronics, electrical engineering and chemicals. On the other hand, the progress of emerging countries in car production makes Germany's suppliers but also the car manufacturers more vulnerable since German technology can be substituted by solutions from other countries. A new crisis of the German car industry would have severe negative consequences for the innovation performance of the country.

5.1.2 East Germany

To date East Germany is endowed with a top public research infrastructure. A number of highly reputed research institutes are located there. In addition some universities which – in comparison to Germany as a whole – also reach top scores in particular in the teaching field. Furthermore, the universities in the new Länder dispose of top modern equipment and laboratories. As a result, qualification level of the students in the East is better than that in the West

At the same time however, research intensity is comparably low. R&D expenditures in per cent of GDP in 2003 amounted to 2.29 per cent (2.56 Germany, 2.61 per cent West Germany)[31]. The public share of R&D expenditures is almost opposite to the situation in the West. According to data provided by the federal government,[32]

[29] Data taken from RWI and Stifterverband für die deutsche Wissenschaft (2005), Zu wenig Forschung und Entwicklung?, Kurzfassung, Düsseldorf, p. 7.
[30] Ibid.
[31] Ibid.
[32] See BMBF (2004), p. 481, Abbildung 89.

evaluators estimate, that in 2001 public share of R&D expenditures in the East amounted to at least more than 50 per cent, whereas in the western Länder public share was significantly below 30 per cent.

An important reason for the poor industrial R&D intensity is the lack of huge firms or at least the lack of headquarters and research centres of huge firms in the new Länder. More than 40 per cent of total research staff in the East are employed by SMEs (in the old Länder it is only 15 percent). SMEs however suffer much more from the insufficient consumption aptitude of the German consumers. Also, the small firms generally and in the new Länder specifically are lacking equity and risk capital so that investments in new product developments, into research and innovation are becoming more and more difficult.

The share of R&D personnel in industry in the East (as compared to Germany) amounts to twelve per cent, while East Germany's share in R&D expenditures only reaches 10 per cent. Labour intensity in research is thus much higher in the East than in the West, or in other words, research productivity in the new Länder is much below the figures reached in the old Länder. The number of research employees in East German industry even grew during the 1990s. However, 50 per cent of this increase was absorbed by Berlin! To date Berlin stands for 40 per cent of total R&D personnel in East Germany, and Germany's capital belongs to the cities with highest research intensities in Germany.

Finally we have to mention that even though we have argued that East Germany can be regarded within Germany as one block, there are also some regional and sectoral competences to be observed. Jena in Thüringen e.g. can be regarded as a top Biotech region. In Sachsen and Sachsen-Anhalt we find a competitive sector of automotive suppliers. The East German industry also has developed specialisations in selected R&D themes. Amongst these are pharmaceuticals, railway vehicles and transport.

5.1.3 Summary

In exhibit 13 below we have summarised the analysis presented above. We differentiate again between West and East Germany and in selected cases we are also presenting some additional insight at Länder level.

Exhibit 13: Factors influencing innovation potential by type of region

Region / type of region	Main factors influencing future innovation potential
West Germany	• Top innovation performance (measured in SII). • Unemployment still persistent; insufficient growth. • Relative high R&D intensity (close to 3 per cent goal). • Efficiency of technology transfer efforts questionable. • Skill bottlenecks likely to become crucial factor for future innovation performance. • Huge concentration of R&D expenditures (50 per cent of expenditures located in the two Länder Bayern and Baden Württemberg). • Car industry as main driver for innovation (risks occurring from car producers from emerging countries).
Bayern/Baden-Württemberg (as major high techno regions)	• Top innovation performance. • Sound economic situation. • Successful transfer activities. • High R&D intensity (> 3 per cent).
Nordrhein-Westfalen (central techno region)	• Central techno region • Too low R&D intensity (1.8 per cent of GDP). • "De-knowledgisation" process taking place. • Transfer activities need to be improved. • Above average unemployment rates.
East Germany (Generally aging academia)	• Top public research and innovation infrastructure • Over average quality of academic education. • Low research intensity (2.29 per cent of GDP); more than 50 per cent of R&D expenditures from public resources. • Lack of huge firms -> R&D activities being conducted to a large extent by SMEs. • Relative high numbers of R&D personnel in industry; labour orientated research (not so much capital based), lower productivity of labour in R&D. • Regional profiles have been developed: eg. Biotechnology in Jena or environmental technology in Leipzig. • R&D specialisation in pharmaceuticals, railway vehicles and transport.
Berlin (Local science and services)	• Local Science and Service region as capital conurbation with headquarters of national research institutions. • Berlin absorbs most of the increase in R&D personnel which was reported for the 1990s.

5.2 A prospective SWOT appraisal of regional innovation potential

This section results in an overall appraisal of the innovation potential of the main types of regions in Germany. In particular we ask, what are the major strengths, weaknesses, opportunities and threats in terms of innovation and knowledge in each region (or type of regions).

Again we differentiate between the two major blocks: East and West. And within those blocks we have a closer look at the main types of region within each block. Against the background of the analysis so far our SWOT will then take a closer look on four major issues which turned out to be relevant throughout the whole study:

- Socio-economic situation
- R&D intensity
- Human capital
- Technology Transfer

5.2.1 West Germany

In exhibit 14 a we are displaying our prospective SWOT analysis for the two major types of regions in West Germany, i.e. the high techno and the central techno type.

Although we have argued so far that for a strategic analysis West Germany as a region comes as a homogenous block, exhibit 14a is concentrating on the two major types of regions in the old Länder. This way of displaying the results of the evaluation also proves the homogeneity of the two main regional types to be identified in West Germany, at the same time however we also see some differences.

Socio-Economic Situation
With regard to the socio-economic situation we can generally say that the high techno regions are better off than the central techno ones. In both types of regions research efforts did not (at least not to a sufficient extent) contribute to the creation of new jobs. Also both types are facing increasing international competition. The different socio-economic situation leads to different assumptions on the learning capability within the regions: in the central techno regions, with the rather coherent economic situation, network building, exchange of ideas and cooperation (all ingredients for successful regional learning) are much easier to be organised than in the central techno regions where in some places we see processes of social exclusion taking place. Tight socio-economic framework conditions however are not supportive to cooperation and institutional learning.

For the future one could expect favourable socio-economic framework conditions to mobilise more private R&D expenditures. In particular small firms will gain more room for R&D investment. However, the business up-swing will not go on forever and businesses tend to adapt R&D expenditures cyclically.

Another point which needs to be discussed is the fact that effects of innovation on employment are uncertain. Innovations can create or they can destroy jobs. In the central techno regions (often old industrialised regions) this would lead to further

Exhibit 14a: Innovation and Knowledge SWOT: West Germany

1) High Techno

Region Type: **High Techno**	**Strengths**	**Weaknesses**	**Opportunities**	**Threats**
Socio-economic situation	- Rather favourable; - Under average unemployment - Sufficient growth	- Limited employment creation	- Slight improvement of the macro indicators in Germany - Sound socio-economic framework conditions help to mobilise private R&D resources - Coherent socio-economic environment supports networking and co-operation	- Next business cycle downswing can deteriorate innovation position - Competitors from emerging countries surge into home and foreign markets of national (German) champions
R&D intensity	- Favourable RTDI environment - High R&D expenditures (> 3 % of GDP) - More than 2/3 of R&D expenditures from private sector	- Huge R&D investment did not create new jobs – at least not sufficiently enough	- Main innovation indicators are moving ahead - High share of industry financed R&D leads to quicker and higher returns	- Too much applied research and product development can deteriorate the basis for future technological developments
Human capital	- World class universities produce excellent graduates	- Number of graduates too low to serve industry's demand - Number of students in hard sciences too small	- New schemes for the promotion of studying hard sciences are being tested - Favourable job opportunities may make studying hard sciences more attractive	- Human Capital deficits can become a crucial bottleneck for further innovation and for economic development
Technology Transfer	- Wide range of TT activities in place - Good practices available	- Transfer results bear room for optimisation - Even in the high techno regions transfer need to be improved in order to boost employment creation	- Dissemination of good practices - Learning from other approaches	- Poor transfer and weak economic results from research can deteriorate citizens' generally positive attitude towards RTDI

2) Central Techno

Region Type Central techno	Strengths	Weaknesses	Opportunities	Threats
Socio-economic situation	- Often strong industrial basis - Dependency from mono structures has been overcome	- Generally tight economic situation often with above average unemployment and insufficient growth - Red end operating public budgets - Poor socio economic framework condition may hinder network creation and co-operations (between firms and between researchers and business men)	- Structural change process revealed options for new income and employment opportunities - Slight improvement of the macro indicators in Germany	- Next business cycle downswing can deteriorate innovation position - Innovation can also increase social exclusion (polarisation effects) - Competitors from emerging countries surge into home and foreign markets of national (German) champions
R&D intensity	- Rather good RTDI environment	- Under average sometimes very low R&D expenditures in per cent of GDP	- Federal government's commitment to 3 % goal may also boost R&D expenditures in the central techno regions	- Research and Innovation gap can increase socio economic gap - At least, economic catching up may become more difficult
Human capital	- Good universities produce excellent graduates	- Number of graduates too low to serve industry's demand - Number of students in hard sciences too small	- New schemes for the promotion of studying hard sciences are being tested - Favourable job opportunities may make studying hard sciences more attractive	- Human Capital deficits can become a crucial bottleneck for further innovation and for economic development
Technology Transfer	- Sometimes very dense TT infrastructures (e.g. NRW) - Wide range of TT activities in place - Good practices available	- Transfer results bear room for optimisation - Particularly for the central techno type of regions more successful transfer activities are desired	- Dissemination of good practices - Learning from other approaches	- Poor transfer and weak economic results from research can deteriorate citizens' generally positive attitude towards RTDI

unemployment and to social problems. The threat is, that innovations would lead to more social exclusion in the economy.

R&D intensity
Here the similarities are larger than it seems at first glance. In both types of regions we have a good to excellent RTDI environment. R&D investments are however at different levels, whereas the overall picture is much more coherent than the extremes (3.81 % for Baden-Württemberg and 1.80 for NRW. In the Saarland (high techno) e.g. R&D expenditures reached only 1.10 per cent of GDP in 2003. Also, we see weak economic exploitation of the R&D efforts taken.

In both type of regions we see the opportunity for research expenditures to increase. For the central techno type the strong political commitment to the three per cent goal might be a driver for more research efforts in the future. In the high techno regions the trend towards applied research goes along with the risk of a deteriorated foundation for future technological developments.

Human Capital
Here we have as general weakness the need for more graduates in hard sciences and for engineers. It is obvious that an increasing disparity between supply and demand in human capital will have significant negative impact on the innovation performance of both the regions and the country generally.

Technology Transfer
With regard to the technology transfer issue again both important regional types which are prevalent in West Germany face the same weaknesses and benefit from the same strengths and they are looking towards the same opportunities and threats. Major issue is the insufficient transfer success! Although innovation indicators are performing well, economic impact is limited. That can be taken as main evidence for transfer activities need to be improved.

5.2.2 East Germany

The main regional type identified for East Germany is the Aging Academia cluster which was the relevant type for nine out of ten regions in the new Länder.

Exhibit 14b: Innovation and Knowledge SWOT: East Germany

Region Type Aging Academia	Strengths	Weaknesses	Opportunities	Threats
Socio-economic situation	- Specialised regional growth nodes for example in the sectors automotive and, biotechnology (Sachsen, Sachsen-Anhalt)	- Low industry density - Severe economic situation with above average unemployment and insufficient growth - Strong migration of labour which leads to areas with very low population densities - Budget restraints	- Structural change process revealed options for new income and employment opportunities - Focus on growth sectors like biotechnology and nanotechnology	- Strong competition by emerging countries - Further decline of economic performance - Increase of unemployment rate
R&D intensity	- Over average quality of academic education - High numbers of R&D personnel - Modern equipment and laboratories	- Low research intensity (in particular in the private sector) - Lack of research centres of huge firms	- Link existing research infrastructure to promising technology fields and traditional sectors (railways, vehicles, transport)	- Further decrease of public R&D expenditures - Research and innovation gap can increase socio economic gap
Human capital	- Good universities produce excellent graduates - Good qualified people	- Lack of jobs leads to severe brain drain	- Over average quality of academic education - Growth sectors in the field of biotechnology and nanotechnology might offer job opportunities	- Very low fertility rate - Aging population - Lack of jobs leads to severe brain drain and the further movement of labour
Technology Transfer	- Quite good TT infrastructures which also includes the European wide transfer of technologies (via the Innovation relay Centre's network)	- Transfer results bear room for optimisation	- Combine university and business R&D activities in competence centres - Enhance demand driven research at universities	- Poor transfer diminishes innovation performance in the business sector

Socio-economic situation
The general situation in East Germany is severe. Budgetary restraints go hand in hand with high unemployment rates. Furthermore the strong migration to West Germany leads to a massive brain drain and the competition from the Eastern European Countries as well as from Asia is fierce for many businesses in East Germany. With regard to the competition from Eastern European Countries the border regions in East Germany are affected in the first place. Nevertheless some promising efforts have been made. One example is the university in Frankfurt/Oder which was set up and plays an important role for the regional development in a problematic region. Further opportunities can be seen in focusing on growing sectors like biotechnology and nanotechnology, in those regions which have a relevant base.

R&D intensity
The R&D intensity can be regarded as low. In particular due to the lack of research capacities of huge firms business R&D expenditure is very low. Nevertheless some areas with R&D excellence have emerged over the last years in Sachsen and Sachsen-Anhalt, for example. In addition the quality of academic education is good and the number of R&D personnel high. A recent report highlighted the excellent situation for medical sciences in Jena, Halle, Magdeburg and Greifswald.[33] These are assets for future development. Moreover, traditional sectors (railways, automotive, transport) are able to support or initiate regional growth processes.

Human Capital
Here the situation is ambivalent. On the one hand one can state good qualified people and universities. On the other hand the lack of jobs leads to a severe brain drain. This goes hand in hand with a low fertility rate and an aging population.

Technology Transfer
With regard to the technology transfer issue one can state a weak transfer that hampers business innovation. In general transfer activities need to be improved. Otherwise the poor transfer rate will diminish the innovation performance in the business sector.

[33] CHE - CENTRUM FÜR HOCHSCHULENTWICKLUNG, 2006, Ergebnisse des aktuellen CHE HochschulRankings,see http://www.che.de.

5.3 Conclusions: regional innovation potential

Against the background of the SWOT analysis provided in section 5.2 we are now elaborating major policy headlines.

Policy headline 1: Minimise polarisation effects of innovation measures in less developed regions

- The socio economic situation influences learning and innovation behaviour. At the same time, innovation does influence socio-economic framework conditions. However, particularly in regions suffering from structural change the impact is not clear: innovation can create jobs but it can also disturb jobs. As we have seen in the SWOT analysis, innovations within a specific territory can lead to more divergence and to social exclusion (case of Jena in Thüringen and case of Dortmund in Nordrhein-Westfalen). This inter-relation is not yet fully reflected in Germany. ERDF co-financed programmes/measures should take the risk of social exclusion induced by innovations much more explicitly into account. In cases where negative employment consequences of innovations are to be expected (like in the high tech strategy of Jena) additional actions which counteract these negative labour market effects need to be implemented. In concrete terms this could be specific training, qualification and/or employment measures financed either by the ERDF or the ESF.
- Regions affected are mainly Central Techno regions in West Germany and Aging Academia regions in East-Germany.

Policy headline 2: Economic exploitation of research and innovation activities is key for economic prosperity

- The need for more efficient technology transfer policies has been mentioned throughout the whole study. Although a wide range of policy measures as well as examples of good practice are existing, general performance is weak. Systematic analysis of the success (and failure) factors and a consequent learning from the good practices is obviously needed in Germany. An "open process of coordination" amongst the Länder (and the Bund) with the application of relevant tools (like peer reviews, inter-regional learning schemes, benchmarking) can thus be highly recommended. The European Trendchart approach may be taken by the German authorities as a good practice example.
- At the same time, the weak transfer results can also be seen as a consequence of the industry's (particularly of SMEs in the east) limited absorption capacity for innovations. Successful transfer policy thus would have to implement measures which are able to increase the absorption capacity of small firms. Awareness raising, public support for transfer projects etc. are thus necessary. Those "softer" projects usually do not require substantial financial resources. We recommend that these kind of actions should not be implemented by the management authorities. As far as evaluators are concerned, SME institutions or technology transfer agencies (which, as we have seen in chapter 3.1, are operative in all Länder) are more appropriate for this.
- As pointed out, some regions in East-Germany (e.g. Jena, Halle, Magdeburg and Greifswald) have a critical RTDI capacity that could transform the regions into research and innovation poles. By this, they are able to trigger growth in neighbouring regions.

- For the Central Techno type the strong political commitment to the three per cent goal might be a driver for more research efforts in the future. In the High Techno regions the trend towards applied research goes along with the risk of a deteriorated foundation for future technological developments.

Policy headline 3: An integrated approach for the stimulation of technology transfer is needed

- This integrated approach should involve university as well as business R&D capacities for the development of new products, processes or services. By this, not only the transfer of knowledge can be stimulated but also the consolidation of regional growth nodes in promising technological fields. Obviously, in the frame of this evaluation we cannot define the concrete technology fields in which such integrated approaches should be started. However, we recommend to use the integrative method both at federal and at Länder level. Both the Länder and the Bund should use competitive calls in order to identify the relevant themes. Main preconditions for a successful integrative approach (as outlined in chapter 4) are the following: (1) critical mass of business actors; (2) existing research excellence; (3) comprehensive supporting network.
- This is relevant for regions which have already a dense technology infrastructure but are not able to exploit the full potential of this structure.

Policy headline 4: A major risk with regard to the German innovation potential is the lack of human capital in hard science

- The gap between the number of graduates on the one hand and industry demand for such skilled experts on the other hand has been mentioned as a risk for Germany's future innovation performance throughout the whole study. In addition comes the brain drain effect in some of the rural areas in the east. It is clear though that the number of graduates can only be increased by attracting more students in the relevant fields. Concrete actions can be:

  - Awareness raising/PR for studying hard sciences and engineering
  - Awareness raising in schools for pupils

- Relevant regions can be found in areas with a good qualification structure that face a “qualification gap” and less developed/rural regions in East-Germany.
- Another point which is frequently being discussed is a national qualification orientated migration policy. Meaning that migrants with a specific qualification profile are pro-actively being attracted.

6 Future priorities for Structural Funds support for innovation and knowledge: options for intervention

In the following section we attempt to summarise our evaluation in a two sets of key conclusions: one more focussing on strategic issues and one more on operational aspects of Structural Funds interventions in Germany.

6.1 Strategic orientations for Structural Funds investments in innovation and knowledge

Key conclusion 1: Network approaches and clusters for innovation become more and more important in Objective 1 and 2 regions

Innovation can be regarded as a learning process and is based on a systemic approach. Networks and clusters – although with different concepts and aims – are appropriate models to stimulate and foster learning processes at different levels (inter-institutional, intra-institutional and personal) and thus can contribute to innovation at regional level. Moreover, these models are important because they are able to bridge or cross different "innovation spheres" (technological innovation, social innovation).

Recommendation 1: Priority for cluster and network support

A broader understanding of innovation that covers technological and social elements (exclusion impact of innovations), enables innovation policy instruments to contribute to growth and cohesion at the same time. In this respect, networks and clusters are appropriate modes (among others). Policy for networks and clusters has to be adapted to the conditions in which they are active. That means, they have to take into account the given regional situation, the innovation potential, the life cycle and the maturity of a network or cluster, broadly speaking.

Evaluators therefore highly recommend to foresee substantial budgets of the 2007-2013 programmes for network and cluster policies. Regarding the implementation of those policies we would like to suggest a two fold approach: Picking high potential clusters (cherry picking) via competitive calls, while at the same time also supporting cluster orientated measures in less developed regions. The latter point seems to be important in order to avoid huge disparities which would obviously be the result of a cluster policy focussing on high-potential clusters only. In less developed regions the focus of cluster policies should also be on supporting existing or potential growth nodes. An example in this respect is the national cluster/network approach POLE DE COMPETITIVITE in France. But, also in Germany cluster type public funding – as described in the good practice section on ERDF measures – was introduced, interestingly funded by the ESF.

Networking and the creation of links between the relevant actors represent important prerequisites for successful innovation and learning systems. However, as we have pointed out, the limited absorption capacity (of firms) is an issue, too. Capacity

building amongst the firms and network building together, thus form the nucleus of a successful innovation policy. ERDF programmes must focus on both these sides of the coin.

Key conclusion 2: Support schemes for science-industry transfer are still of high importance in Objective 1 and 2 regions

The leading position of Germany in the European Innovation Scoreboard on the one hand and the poor economic situation on the other hand show that know-how transfer is a limiting factor in Germany. At the same time it is clear that technology transfer is not a simple linear process.

Recommendation 2: A diversified approach for technology-transfer

Technology transfer in Germany often follows a linear vision. Policy actors and economic development agencies see the need for more and better transfer – and the evaluators agree to this point. However, there is a prevailing vision (if not dream) of transferring technologies from universities directly into firms, best into SMEs.

The evaluators highly recommend to regard this "classical" university/industry transfer as only one possible mean. Other options need to be identified and tested. Our experience shows that the gap between universities of applied sciences (Fachhochschulen) and industry is easier to overcome. Technology transfer measures should thus be a bit more pragmatic. Also, as mentioned above, good practice needs to be disseminated!

Secondly, non-university research must be more intensively taken into account also. Last but not least, as far as evaluators are concerned there is room to increase the role of spin offs from research institutes and of personnel transfer schemes (from research to industry and vice versa) in order to enhance the utterly needed transfer.

Therefore, ERDF should no longer only finance concrete technology transfer projects and programmes (e.g. the Zukunftswettbewerb in NRW). It should rather also help to improve the technology transfer actions which are being applied. The following measures would be desirable:

- the identification of good practice in Germany;
- creation of an experience exchange platform;
- systematic learning from good practice.

Existing structures should be integrated in these activities (e.g. the network of IRCs).
Do to the fact that these measures address an bottleneck of general character relevant measures should be implemented at Federal level. It would be of added value for developed and less developed regions at the same time.

Key conclusion 3: Create better links to FP 7 and CIP measures

As described in chapter 4, the EU framework programmes on R&D (FPs) have a negative cohesion impact in the sense that key absorbents of R&D funds from the EU FPs are located outside the Objective 2 regions. At the same time, universities within

Objective 2 regions at a lesser level participated in FP5/6. Quantitative financial data on FP6 is hardly available. We estimate however, that the FP6's divergent forces counteract ERDF support in the field of RTDI. At least, FP6 impacts hamper ERDF effects in that field.

In Objective 1 regions in the new Länder this effect is not as visible as in the old Länder as Objective 1 covers the whole territory. We see however very strong FP6 participation rates in Dresden and in Jena, i.e. in localities which are also better off than the rest of the new Länder. Here again, we would see negative cohesion effects of FP5/6.

Recommendation 3: More Intelligent combination of FP and ERDF

Firstly we argue for a strengthening of the regional dimension in FPs. Programmes like the "Regions of Knowledge" funding scheme might be a first step.

FP programmes finance excellence. It would be far beyond the scope of our evaluation to question this key principle of European research policy. However, cohesion policy can improve the capacities of researchers within Objective 1 or 2 regions and prepare them to fulfil the excellence criterion and thus to better exploit European research funds. We are far away from pushing here the money argument into the front. However, if regions which are facing structural problems, do not sufficiently enough participate in European research networks, they will not be able to integrate themselves into the European Research Area. Cohesion gap will then be followed by a knowledge gap and vice versa and it will be even more difficult for those regions to catch up.

For the ERDF we see good potential to finance capacity building in universities. The aim would be to accomplish a higher (and more successful) participation rate at FP 6/7 of universities in the less developed regions. Concrete actions could be:

- information provision and training on the opportunities of the FPs;
- Proposal writing support;
- Awards for "eligible" proposals presented to the Commission.

Thus, operational programmes laying down rules for RTDI interventions in less developed regions should integrate activities for information and capacity building measures with regard to FP7. Eligible proposals to the Commission with regard to FP7 should receive an incentive from the ERDF.

Key conclusion 4: Demand for Revolving Funds, Seed capital

The demand for revolving funds and seed capital to stimulate innovation is still strong although at the end of the intervention period some revolving funds for innovation projects financed by the SF were set up. Furthermore some local seed capital schemes were put into practice (for example in Berlin, Dortmund, Aachen). Nevertheless there is a demand for these financial arrangements with respect to innovation projects.

Recommendation 4: Set up alternative financial arrangements for innovative funding schemes

Alternative financial arrangements for innovative projects are needed to exploit better the innovative potential at regional level. Traditional funding schemes tend to neglect projects that apparently have high risks (from a banker's angle). Furthermore the rating system for the assessment of innovative projects focuses on financial elements rather than innovative aspects. That means, in addition to new financial arrangements, that better rating systems for innovative projects are needed. With regard to the latter, a national expert group (existing of Managing Authorities, banks, …) could draft guidelines for a better rating of innovative projects under the SF. These "new" financial arrangements have been introduced in Germany lately but only in few regions. In contrast, France set up an interest free loan programme funded by the ERDF years ago (see www.oseo.fr). Its aim is to support innovative projects in SMEs. Grants have to be paid back in case of success.

Key conclusion 5: Fragmented RTDI system in Germany provides room for coordination measures financed by ERDF

We have seen that Germany's research system is rather complex if not fragmented. At the same time ERDF contributions only play a minor role within the huge amount of more than 54 bln EUR of R&D expenditures in Germany. In this setting, ERDF's influence was thus limited.

However, in the future ERDF could play a more visible and at the same time more coordinating role by financing programmes at national or at least at cross-Länder level (multi-regional approach). The ESF co-financed learning regions programme, described in chapter 4, represents an example for such kind of actions.

Recommendation 5: Overcome limited ERDF role in innovation policy by introducing nation wide initiatives

We have pointed out here the need for a coherent innovation strategy for the new Länder. The elaboration of such a study could be financed by ERDF. Also, a joint strategy of the Länder and the Bund towards the 3 per cent Barcelona objective would be needed. Here again, ERDF could finance the development of the strategy as well as some pilot projects for its implementation.

Finally, ERDF could also play a visible and significant role concerning other issues which are of relevance for the majority of the regions and for Germany as a whole. Currently the foreseen human capital bottleneck would be an excellent field for that. With regard to the latter, ERDF could support a national initiative (like the learning regions) aiming at overcoming the skill bottleneck.

6.2 Operational guidelines to maximising effectiveness of Structural Funds interventions for innovation and knowledge

Key conclusion 6: Integration of private resources for co-financing projects under the EU Structural Funds

In times of tight public budgets private resources should be used in order to co-finance Structural Funds interventions.

Recommendation 6: Use private resources as co-financing

The use of private resources for co-financing projects could enhance the absorption of EU funds. While drafting the Operational Programmes for ERDF interventions programme authorities should detect measures with a high potential for private co-financing of ERDF projects. Generally speaking, SME related measures are addressed. Here, private resources can enhance the absorption of ERDF funds.

Key conclusion 7: Administrative burden hampers efficient implementation

"Small" innovation schemes undergo the same administrative rules as "large" schemes. This often goes hand in hand with administrative rules that are not appropriate and thus hamper the smooth implementation of innovation activities.

Recommendation 7: Flexibility for Innovation Schemes

A differentiated approach for "small" and "large" innovation funding schemes might be a first step to cut red tape in the context of the Structural Funds intervention. In particular innovation schemes need a maximum of flexibility to exploit the innovation potential. The following thumb rules might be a orientation:

- Do not overdo the assessment/evaluation of innovation projects in the application phase.
- Innovation projects need a certain degree of flexibility in the work programme.
- Allow innovation projects to fail! Why not accepting that one out of three projects in a highly innovative environment will fail.

Key conclusion 8: Enhancing Structural Funds management

Flexible implementation bodies acting on behalf of the Managing Authority are important in terms of a smooth and time efficient implementation in particular for innovative schemes.

Recommendation 8: Setting up of innovation agencies

Innovation agencies should be set up with the aim to enhance the implementation of innovation funding schemes within Structural Funds interventions.

Exhibit 15: Summary of recommendations on investment priorities

Region or group of regions	Strategic focus	Priority measures	Indicative financial resources
Federal Level	Installation of the federal level as a coordinating actor in the ERDF financed innovation policy mix.	• Development of a comprehensive cross-Länder strategy "Towards the 3 % Barcelona Goal".	< 5 MEUR for the 2007-13 period.
	Exploitation of research efforts needs to be improved in order to boost economic development.	• Systematic analysis of the success (and failure) factors of technology transfer schemes in Germany and consequent learning from good practice. -> Implementation of a specific programme which supports the application of efficient tools like peer reviews, inter-regional learning schemes and benchmarking.	App. 10 - 15 MEUR for the 2007-13 period.
West Germany	Improving the human capital endowment in the field of hard sciences and engineering.	• Creation and installation of a horizontal/(national) scheme (competition based) on new and innovative regional ideas to increase the number of students in the faculties concerned.	App. 50 MEUR for the 2007-13 period.
	Fostering the cooperation and the networking between the different innovation actors and drivers.	• Cluster support schemes would need priority in all western Länder; • Focus on clusters with high technological potential.	10 – 15 % of RTDI budget in the Länder
High Techno Regions	The citizens' general positive attitude towards science and technology needs to be reinforced.	• Awareness raising campaigns of science and technology for the general public; • Science goes public approaches.	5 – 10 % of RTDI budget
Central Techno	Structural Funds interventions need to take into account that clustering, networking and regional learning are being counteracted by social exclusion tendencies of innovations.	• Do not forget innovation losers; • Integrate qualification measure into innovation approaches.	Integrative approach; cannot be calculated.
East Germany	Fostering the cooperation and the networking between the different innovation actors and drivers.	• Cluster support schemes would need priority in all new Länder; • Focus on clusters in less developed regions.	App. 10 % of RTDI budget in the Länder
	Overcoming the innovation gap between the East and the West.	• Comprehensive innovation strategy for the East. • Combine university and business R&D activities in competence centres.	App. 15 % of RTDI budget in the Länder

Region or group of regions	Strategic focus	Priority measures	Indicative financial resources
Horizontal Aspects (issues which concern all or many regions, but which do not need to be addressed a federal level)	Overcome the divergence effects of the European R&D Framework Programmes (FPs) in particular in those regions which are already lagging behind (and which are to found in all Länder in the East and in the West).	The Länder should try to improve the participation of universities and research institutes in those regions in FPs to compensate their divergent effects: • information about FPs; • training for researchers; • proposal writing support (financial contribution to the costs of the elaboration of a proposal); • awards for eligible proposals presented to Commission.	Depending on the concrete situation in a respective Land. < 5 % of RTDI measures of ERDF

Appendix A Methodological annex

A.1 Quantitative analysis of key knowledge economy indicators

A 1.1 Factor analysis

In order to analyse and describe the knowledge economies at regional level in the EU, the approach adopted was to reduce and condense all relevant statistical information available for a majority of regions. The approach involved firstly reducing the information from a list of selected variables (Table 1) into a small number of factors by means of factor analysis.

Table 1. Reduction of the dataset (215 EU-27 regions) into four factors by means of factor analysis

	The 4 factors			
	F1 'Public Knowledge'	F2 'Urban Services'	F3 'Private Technology'	F4 'Learning Families'
Higher education (HRSTE), 2003	**.839**	.151	.190	.184
Knowledge workers (HRSTC, core), 2003	**.831**	.164	.267	.327
High-tech services employment, 2003	**.575**	.367	.428	.323
Public R&D expenditures (HERD+GOVERD), 2002	**.543**	.431	.275	-.195
Value-added share services, 2002	.323	**.869**	.002	.121
Value-added share industry, 2002	-.265	**-.814**	.386	-.061
Employment government administration, 2003	-.217	**.745**	.124	-.175
Population density, 2002	.380	**.402**	.043	.038
High and Medium/high-tech manufacturing employment, 2003	-.073	-.331	**.873**	-.089
Value-added share agriculture, 2002	-.222	-.350	**-.672**	-.198
Business R&D expenditures, 2002	.335	-.050	**.664**	.267
S&T workers (HRSTO, occupation), 2003	.560	.178	**.589**	.382
Population share under 10 years of age, 2001	-.237	.060	-.015	**.868**
Life-long learning, 2003	.472	-.009	.165	**.703**
Activity rate females, 2003	.418	-.227	.281	**.620**

Note: Principal Component Analysis. Rotation Method: Equamax with Kaiser Normalization, a Rotation converged in 9 iterations. Main factor loadings are highlighted in bold. Source: MERIT, based on Eurostat data, mostly referring to 2002 or 2003

Based on the variable with the highest factor loadings we can characterise and interpret the four factors and give them a short symbolic name:

Public Knowledge (F1)
Human resources in Science and Technology (education as well as core) combined with public R&D expenditures and employment in knowledge intensive services is the most important or common factor hidden in the dataset. The most important variables in Public Knowledge are the education and human resource variables (HR S&T education and core). Cities with large universities will rank high on this factor.

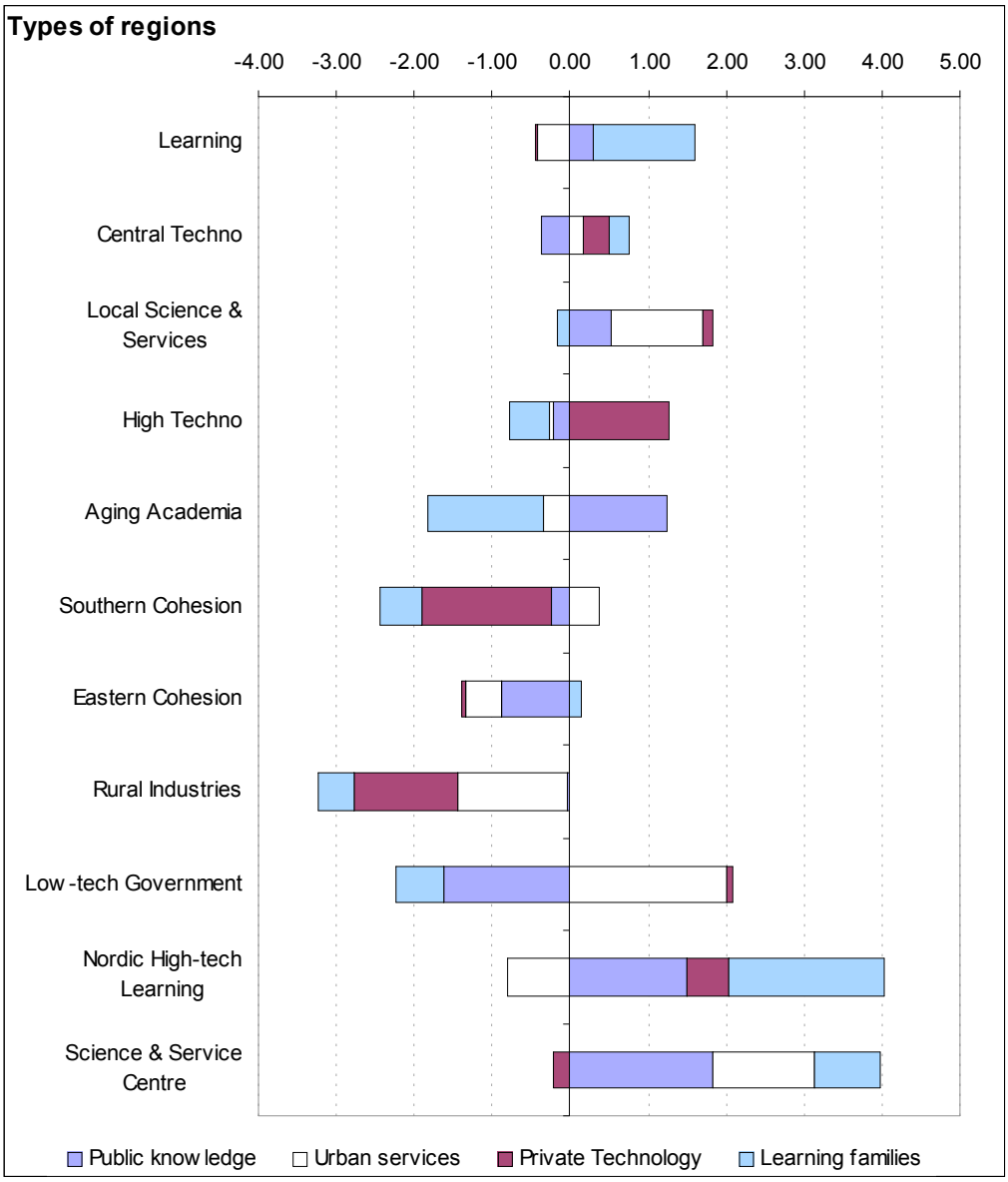
One interesting conclusion is that public and private knowledge are two different factors (F1 and F3 respectively), which for instance has implications for policy issues regarding Science-Industry linkages. Public R&D and higher education seems especially related to high-tech services, whereas Business R&D especially serves high- and medium-high-tech manufacturing.

Urban Services (F2)
This second factor contains information on the structure of the economy. It is well known that industrial economies are quite different from services based economies. It is not a matter of development per se, because in the European regions the variety of economic structure is very large and for a large part based on endowments and path dependent developments like the extent to which government administration is located in a region or not. This factor takes into account the differences between an industrial area and a service based area including the public administration services of the government. Another observation is that there are two different 'urban' factors, indicating that academic centres not necessary co-locate with administration centres. What may not be surprising is that the Urban Services factor is not associated with R&D, since R&D is more relevant for innovation in manufacturing than for service industries.

Private Technology (F3)
This factor contains business R&D, occupation in S&T activities, and employment in high- and medium-high-tech manufacturing industries. A countervailing power is the existence of agriculture in the region. One interpretation could be that agricultural land-use goes at the cost of possibilities of production sites. Another interpretation is that agriculture is not an R&D intensive sector.

Learning Families (F4)
The most important variable in this factor is the share of the population below the age of 10. Locations with relatively larges shares of children are places that are attractive to start a family. Possibilities for Life Long Learning in a region seems associated with the lively labour participation of the mothers of these youngsters. The Learning Families factor could also be interpreted as an institutional factor indicating a child-, learning- and participation- friendly environment, or even a 'knowledge-society-life-style' based on behavioural norms and values that are beneficial to a knowledge economy.

A 1.2 Description of the 11 types of EU regions



1 Learning

The Learning regions are first of all characterised by the high score on the factor 'Learning Families', and the three main components of this factor: life-long-learning, youth and female activity rate. On the other factors the regions are close to the regional average. Unemployment is on average the lowest compared to the other EU regions. Employment in the government sector is limited. GDP per capita is rather high. The regions are located in Austria, Ireland, the Netherlands, Sweden and the UK. There are many similarities with the Nordic High-tech Learning regions, but the business sector in the Nordic version invest more in R&D.

2 Central Techno

This is a rather large group of regions located mostly in Germany and France with close to average characteristic, but the share of High-tech manufacturing is rather

high. The factor-scores as well as GDP-per head is slightly above the regional average, except for the Public Knowledge factor which is slightly lower.

3 Local Science & Services

This group of regions with diverse nationality consist mainly of capital cities, such as Madrid, Warsaw, Lisbon, Budapest and Athens. These urban area's serve as national centres for business services, government administration, public research institutes and universities. Urban Services and Public knowledge are therefore the strongest factors for this type of region. GDP per capita is on average slightly below the EU25 average, but growing. The low score on life-long-learning is a weakness in most Local Science & Services regions, especially compared to the more wealthy and advanced Science & Service Centres.

4 High Techno

The High Techno regions host many high-tech manufacturing industries. They are mostly located in Germany (e.g. Bayern and Baden-Wurtemberg), some in Italy (e.g. Lombardia and Veneto) and two French regions. This type is very strong in Private Technology and has a high level of GDP per capita. The factors Public Knowledge and especially the Learning Family factor shows a relative weakness, e.g. in life-long-learning. Growth in terms of GDP per capita has been low and unemployment didn't improve much in the previous years.

5 Aging Academia

This group of regions is mostly located in East-Germany and Spain and also includes the capital regions of Bulgaria and Romania. The strength in the Public Knowledge factor is mostly based on the high share of people with tertiary education. The low score on the Learning Family factor is due to little life-long-learning and hosting relatively few children. The unemployment situation has improved, but is still very high.

6 Southern Cohesion

Southern cohesion regions are located in Southern Europe, consisting of many Greek, some Spanish and two Portuguese regions. The low score on the Private Technology factor is striking. There is hardly any high-tech manufacturing nor business R&D. Services is the most important sector, but also agriculture is still a rather large sector. The share of manufacturing industry in value added is very limited. Population density is low, but on average it has been increasing.

7 Eastern Cohesion

Manufacturing industries is the dominant sector, whereas services and agriculture are rather small sectors. This type of region is mostly located in Poland, Czech Republic, Hungary and Slovak Republic. Two Portuguese regions are also included. The Public Knowledge factor is the main weakness of this type of regions. However, the score on the Private Technology factor is close to average, which means that it is much stronger in this respect than the Southern Cohesion regions. Unemployment is high, even compared to Rural Industries and Southern Cohesion regions.

8 Rural Industries

Besides a low per capita GDP, Rural Industries regions have in common a low score on both the factors Urban Services and Private Technology. Population density is

very low. The service sector is often very small. Especially agriculture but also manufacturing industries are relatively large sectors. Besides regions in Bulgaria and Romania and Greece, there is also a more nordic sub-group consisting of Estonia, Lithuania and Itä-Suomi

9 Low-tech Government
This type of region, mostly located in southern Italy is characterised by a very low score on Public Knowledge combined with a high share of employment in the Government sector. Unemployment is severe, on average comparable to Eastern Cohesion regions. GDP per capita is however close to the regional average.

10 Nordic High-tech Learning
The Nordic version of the learning regions are typically strong in the Learning Family factor, but this type also has by far the highest business R&D intensity. In contrast with the popular characterisation of Nordic societies, the size of the government administration is the lowest of all the types. The low score on Urban Services is also due to the low population density. A rather unique feature of this type of regional knowledge economy is the combined strength in both the Public Knowledge and the Private Technology factor.

11 Science & Service Centre
The main characteristics of this urban group of regions are the high scores on the Public Knowledge and Urban Services factors. Population density is very high. This type also has the highest GDP per capita and productivity. The variables that are captured by the factor Learning Families also show a score above the regional average, but disappointing is the relatively low presence of high and medium-high-tech manufacturing and the business R&D intensity.

A.2 Qualitative analysis and preparation of country reports

In summary, the country reports were prepared in the following stages:

A first country document was prepared by the core study team in the form of a **template country report**. It contained overall guidance to the country experts and included a number of pre-filled tables, graphs and analysis sections based on information available at EU level.

Next, the core team members and the national experts who were involved in the pilot phase of the project commented completed elements of the templates. Drafted elements and templates were completed and compiled into **first country briefings (draft pilot reports)** by the national experts involved in the pilot phase of the project. These pilot country reports were prepared by experts for Belgium, Greece, Italy, France, and Poland.

Once the five first country briefings were completed, a **final set of guidelines** was prepared by the core team. These guidelines were agreed with the Commission services responsible for this evaluation. Prior to this, all first country briefings were reviewed during the January 2006 and presented to a first meeting of the scientific committee.

The work during the **country analysis phase** included:

Undertaking a series of key interviews (KI) with policy decision makers;
Organising a focus group (FG) with key national or regional RDTI stakeholders;
Collecting additional information and finalising short case studies; and
Preparing the synthesis notes of these various activities.

The above-mentioned work served as qualitative data and allowed the national experts to compile the draft **country reports**. All reports were subsequently reviewed, checked and finalised by the core team and the consortium members. Once this first check was completed, the core team organised a final peer reading of the document to verify its overall consistency and to ensure a final English language editing of the document. The core team then completed the final editing and layout of the document with a view to publication.

An overall synthesis report of all has been prepared and will be published by the European Commission providing an overview of the issues addressed in each of the 27 country reports produced by the evaluation team.

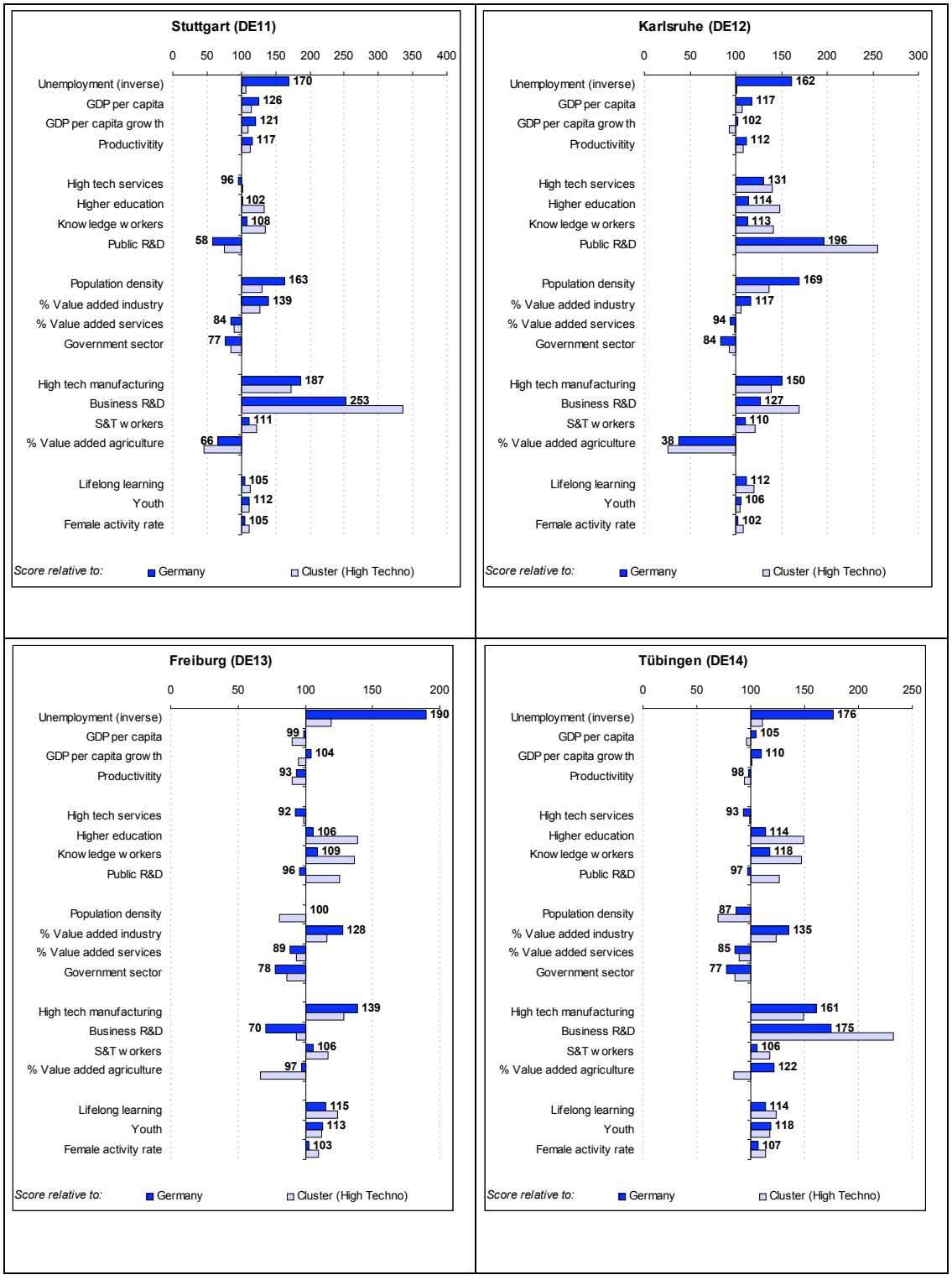
Appendix B Statistical tables and regional scorecards

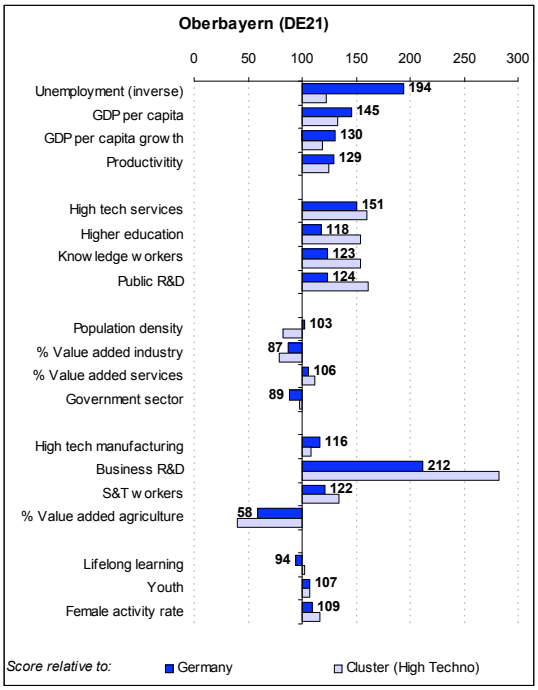
B.1 Overall quantitative analysis per region

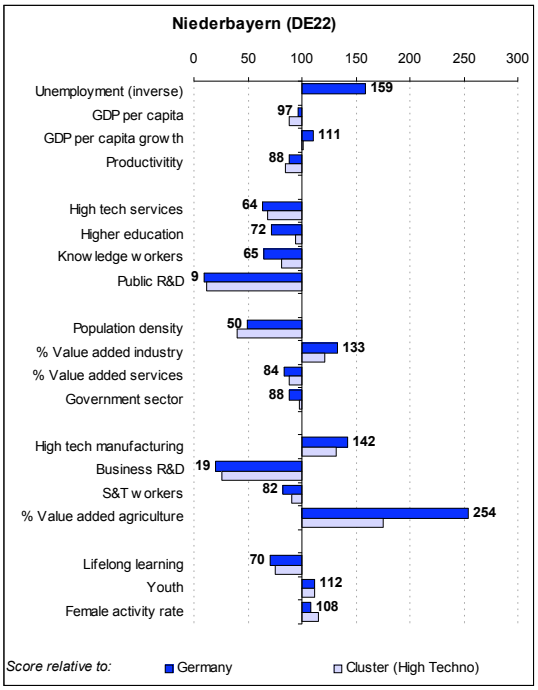
			Economic performance				Public knowledge				Urban services				Private technology				Learning families		
		Cluster	Unemployment	GDP per capita	GDP per capita growth	Productivity	High tech services	Higher education	Knowledge workers	Public R&D	Population density	% Value added industry	% Value added services	Government sector	High tech manufacturing	Business R&D	S&T workers	% Value added agriculture	Lifelong learning	Youth	Female activity rate
			2003	2002	1996-2002	2002	2003	2003	2003	2002	2002	2002	2002	2003	2003	2002	2003	2002	2003	2001	2003
EU25			9,2	21170	4,8	4556	3,2	20,7	11,6	0,69	117	27,0	70,9	7,5	6,6	1,24	20,7	2,1	8,7	10,8	48,3
Regional average			9,4	18882	4,8	3914	2,8	18,9	10,7	0,49	294	28,9	66,6	7,6	6,5	0,80	19,5	4,3	7,1	10,5	47,2
Germany	DE		9,7	23012	3,3	5400	3,3	22,9	12,9	0,76	231	28,8	70,1	8,1	11,0	1,75	25,2	1,1	6,0	9,7	49,4
Relative to EU25			95	109	69	119	104	111	111	110	198	107	99	108	167	141	122	53	69	90	102
Stuttgart	DE11	4	5,7	29032	4,0	6305	3,2	23,4	14,0	0,44	377	40,1	59,2	6,2	20,6	4,42	28,0	0,7	6,4	10,8	51,8
Karlsruhe	DE12	4	6,0	27024	3,4	6066	4,4	26,0	14,6	1,49	391	33,7	65,9	6,8	16,6	2,22	27,8	0,4	6,7	10,2	50,4
Freiburg	DE13	4	5,1	22770	3,4	5032	3,1	24,3	14,1	0,73	231	36,9	62,0	6,3	15,3	1,23	26,6	1,1	7,0	10,9	50,9
Tübingen	DE14	4	5,5	24184	3,6	5268	3,1	26,1	15,2	0,74	200	39,0	59,7	6,3	17,8	3,06	26,8	1,4	6,9	11,4	52,9
Oberbayern	DE21	4	5,0	33454	4,3	6981	5,0	27,0	15,9	0,94	237	25,1	74,3	7,2	12,9	3,71	30,6	0,7	5,7	10,4	54,0
Niederbayern	DE22	4	6,1	22215	3,7	4745	2,1	16,5	8,4	0,07	115	38,2	58,9	7,2	15,7	0,34	20,8	2,8	4,2	10,8	53,3
Oberpfalz	DE23	4	6,6	22738	3,7	5067	2,4	16,9	9,8	0,39	112	34,2	64,0	8,7	12,9	1,88	22,8	1,8	5,4	10,8	50,9
Oberfranken	DE24	4	8,8	22229	3,0	5050	2,1	16,6	8,7	0,31	154	36,4	62,3	7,0	12,4	0,94	21,0	1,3	5,0	10,1	52,7
Mittelfranken	DE25	4	7,4	26021	3,1	5815	3,8	20,7	11,0	0,58	235	29,7	69,3	6,6	13,9	2,62	23,9	0,9	5,5	10,2	51,2
Unterfranken	DE26	4	6,3	22258	3,3	4985	2,2	18,8	10,7	0,57	157	33,8	64,5	7,3	15,1	1,56	23,6	1,7	5,6	10,6	49,6
Schwaben	DE27	4	5,8	23344	3,2	5050	2,5	21,1	11,6	0,08	177	36,0	62,6	7,8	13,4	1,02	24,1	1,5	6,0	11,2	52,0
Berlin	DE3	3	17,5	20454	1,6	4943	4,7	31,1	17,9	1,90	3803	17,4	82,4	10,0	5,9	2,31	29,4	0,2	9,9	8,1	52,3
Brandenburg	DE4	5	18,0	15538	3,4	3721	3,3	28,9	14,7	0,94	88	24,8	72,7	11,5	5,6	0,55	23,4	2,5	6,8	6,6	55,2
Bremen	DE5	4	11,1	31673	4,3	8109	3,7	16,8	10,4	1,10	1633	29,4	70,3	7,5	9,3	1,06	24,2	0,2	7,7	9,1	44,0
Hamburg	DE6	11	9,4	39766	3,7	8955	4,4	23,1	14,8	0,73	2287	18,7	81,2	6,2	6,4	0,78	30,8	0,2	7,9	8,9	51,4
Darmstadt	DE71	4	6,8	32474	3,4	7178	5,1	26,3	16,6	0,44	504	21,5	78,1	7,4	13,1	2,55	30,8	0,4	7,3	9,9	50,8
Gießen	DE72	2	7,4	20929	3,5	4914	3,0	20,9	12,5	0,92	198	33,3	66,0	9,0	10,3	0,81	26,0	0,6	6,6	10,4	49,0
Kassel	DE73	2	7,8	22509	3,7	5416	2,6	19,9	11,1	0,22	153	30,4	68,6	9,0	11,4	0,52	21,9	1,0	5,4	10,1	48,3

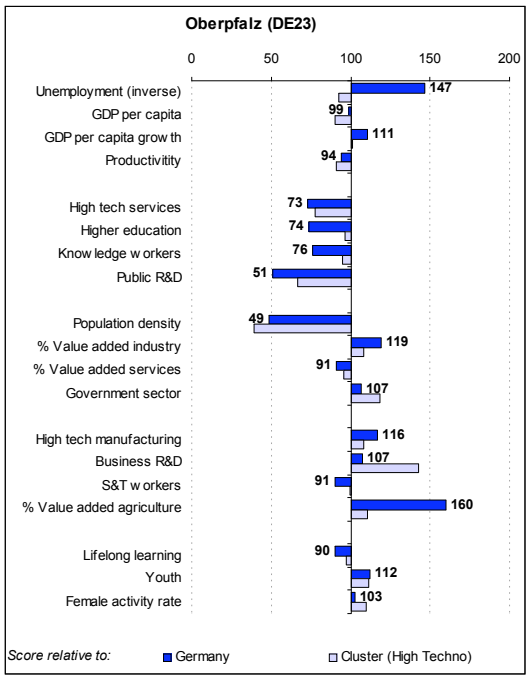
			Economic performance				Public knowledge				Urban services				Private technology				Learning families		
		Cluster	Unemployment	GDP per capita	GDP per capita growth	Productivity	High tech services	Higher education	Knowledge workers	Public R&D	Population density	% Value added industry	% Value added services	Government sector	High tech manufacturing	Business R&D	S&T workers	% Value added agriculture	Lifelong learning	Youth	Female activity rate
			2003	2002	1996-2002	2002	2003	2003	2003	2002	2002	2002	2002	2003	2003	2002	2003	2002	2003	2001	2003
EU25			9,2	21170	4,8	4556	3,2	20,7	11,6	0,69	117	27,0	70,9	7,5	6,6	1,24	20,7	2,1	8,7	10,8	48,3
Regional average			9,4	18882	4,8	3914	2,8	18,9	10,7	0,49	294	28,9	66,6	7,6	6,5	0,80	19,5	4,3	7,1	10,5	47,2
Germany	DE		9,7	23012	3,3	5400	3,3	22,9	12,9	0,76	231	28,8	70,1	8,1	11,0	1,75	25,2	1,1	6,0	9,7	49,4
Relative to EU25			95	109	69	119	104	111	111	110	198	107	99	108	167	141	122	53	69	90	102
Mecklenburg-Vorpom	DE8	5	20,1	15237	3,2	3795	2,1	27,2	12,5	1,00	76	19,1	76,9	11,1	3,7	0,18	20,1	3,9	6,8	6,5	52,6
Braunschweig	DE91	4	9,8	22098	3,8	5530	3,8	19,2	11,8	1,86	206	41,1	57,7	7,6	18,4	5,25	25,6	1,2	6,0	9,8	45,3
Hannover	DE92	2	7,9	21771	2,0	5324	2,9	21,0	12,5	0,67	240	26,0	72,5	9,4	10,0	1,50	27,2	1,4	5,4	10,0	47,1
Lüneburg	DE93	2	7,9	17027	2,2	3958	2,6	18,9	10,2	0,12	109	25,3	71,6	9,2	8,1	0,42	22,7	3,1	4,5	11,1	48,6
Weser-Ems	DE94	2	8,2	20278	3,2	4931	1,5	17,8	9,4	0,20	164	31,0	65,3	7,3	8,0	0,30	21,0	3,7	4,5	11,7	45,9
Düsseldorf	DEA1	2	8,9	25773	3,4	6350	3,1	18,6	10,6	0,36	993	24,9	74,6	7,1	8,8	1,17	24,2	0,5	5,2	9,9	44,7
Köln	DEA2	4	7,9	24660	2,5	6001	4,2	23,3	14,5	1,42	587	24,1	75,5	9,7	10,3	1,76	28,1	0,4	5,8	10,4	44,9
Münster	DEA3	2	8,5	18995	3,0	4759	2,4	19,1	10,9	0,46	380	28,5	69,6	7,6	9,2	0,46	22,6	1,9	6,4	11,2	44,1
Detmold	DEA4	2	8,0	22087	2,5	5287	2,5	18,1	10,6	0,30	317	33,8	64,9	6,6	9,3	0,87	24,2	1,4	5,7	11,3	48,1
Arnsberg	DEA5	2	9,9	21044	3,1	5298	2,9	18,1	10,0	0,51	475	32,8	66,8	7,5	9,3	0,66	21,4	0,4	5,4	10,2	44,0
Koblenz	DEB1	2	6,6	19233	2,7	4594	3,4	18,9	10,2	0,14	189	29,9	69,2	10,1	9,1	0,51	23,2	0,9	4,3	10,5	46,4
Trier	DEB2	2	5,0	18283	2,4	4335	2,8	19,7	10,8	0,47	104	28,4	69,2	9,6	5,0	0,60	23,6	2,4	6,3	10,4	45,0
Rheinhessen-Pfalz	DEB3	4	6,4	21759	2,8	5042	4,2	23,4	13,6	0,73	294	34,4	64,1	8,7	14,6	2,37	26,2	1,5	5,4	10,1	48,0
Saarland	DEC	4	8,1	21874	3,9	5499	2,8	16,5	9,0	0,63	415	31,3	68,4	8,0	9,4	0,38	21,5	0,3	3,6	9,2	42,5
Chemnitz	DED1	5	17,3	14713	3,7	3672	2,2	28,7	13,5	0,60	261	31,0	67,7	8,5	9,9	0,96	19,7	1,3	5,2	6,2	51,0
Dresden	DED2	5	16,5	15900	3,4	3937	3,2	31,5	17,2	1,72	213	28,5	70,1	8,5	8,3	1,91	23,3	1,4	6,5	6,5	52,0
Leipzig	DED3	5	19,4	16095	1,9	4054	4,2	31,2	16,1	1,39	247	21,9	76,5	8,4	5,7	0,70	23,0	1,6	6,6	6,3	52,4
Dessau	DEE1	5	21,3	14085	3,6	3620	1,6	23,3	10,4	0,14	124	30,1	67,7	8,4	8,6	0,49	18,6	2,2	2,8	6,1	51,6
Halle	DEE2	5	21,3	15919	4,0	4191	2,4	26,2	12,9	1,25	191	27,1	71,0	8,9	7,3	0,42	21,0	1,8	4,8	6,3	52,1
Magdeburg	DEE3	5	17,6	15219	4,3	3733	2,0	23,7	12,7	1,02	101	24,8	72,3	9,6	6,4	0,22	22,1	2,9	4,0	6,6	53,4
Schleswig-Holstein	DEF	3	8,7	20949	2,5	4985	3,1	20,0	10,9	0,62	178	22,2	75,9	10,4	7,1	0,53	26,4	1,9	6,5	10,5	48,2
Thüringen	DEG	5	16,1	15394	4,3	3636	2,5	28,0	14,4	0,95	149	29,0	69,1	9,1	8,8	1,11	22,4	2,0	6,0	6,4	52,7

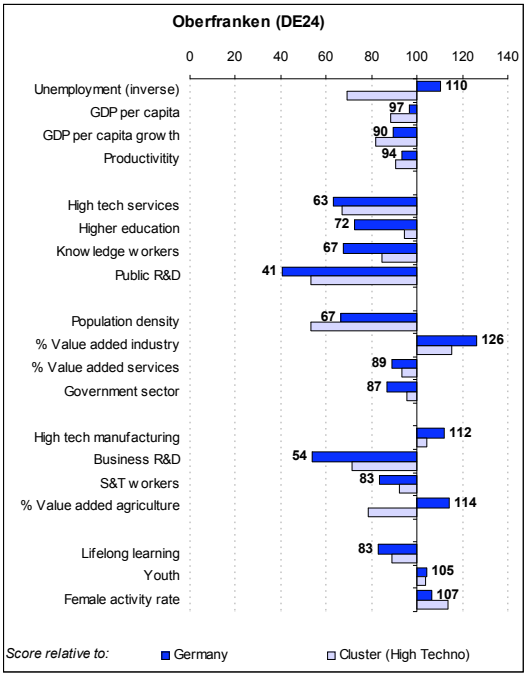
B.2 Regional Scorecards

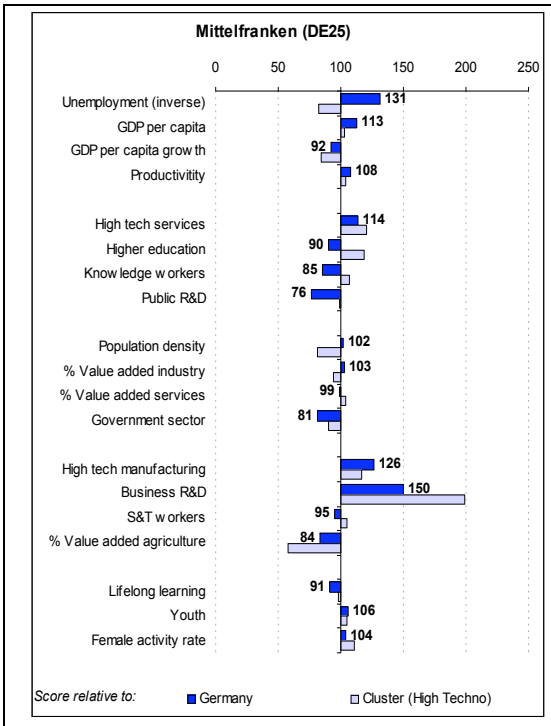


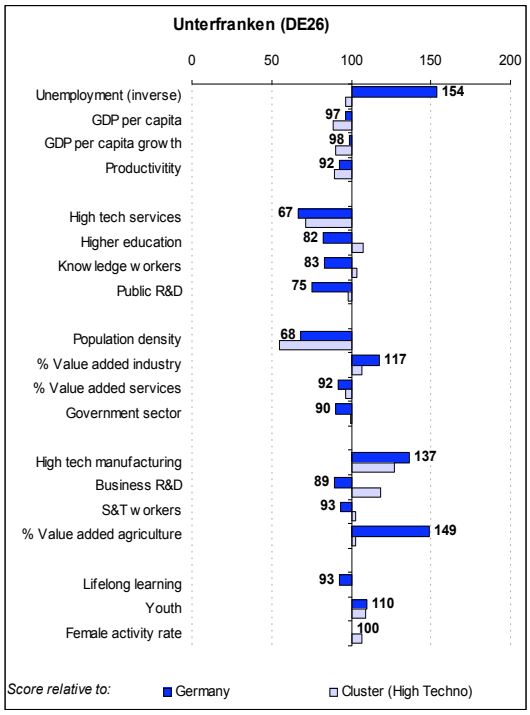

Oberbayern (DE21)
0 50 100 150 200 250 300
Unemployment (inverse) 194
GDP per capita 145
GDP per capita grow th 130
Productivitity 129
High tech services 151
Higher education 118
Know ledge w orkers 123
Public R&D 124
Population density 103
% Value added industry 87
% Value added services 106
Government sector 89
High tech manufacturing 116
Business R&D 212
S&T w orkers 122
% Value added agriculture 58
Lifelong learning 94
Youth 107
Female activity rate 109
Score relative to: Germany Cluster (High Techno)

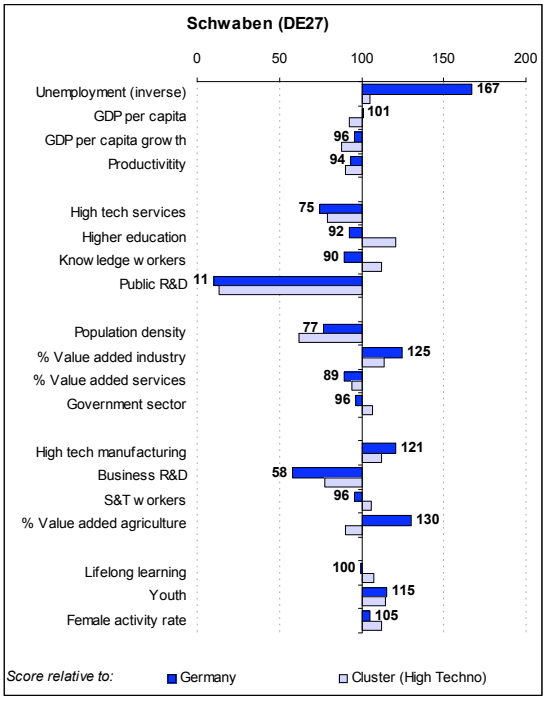

Niederbayern (DE22)
0 50 100 150 200 250 300
Unemployment (inverse) 159
GDP per capita 97
GDP per capita grow th 111
Productivitity 88
High tech services 64
Higher education 72
Know ledge w orkers 65
Public R&D 9
Population density 50
% Value added industry 133
% Value added services 84
Government sector 88
High tech manufacturing 142
Business R&D 19
S&T w orkers 82
% Value added agriculture 254
Lifelong learning 70
Youth 112
Female activity rate 108
Score relative to: Germany Cluster (High Techno)

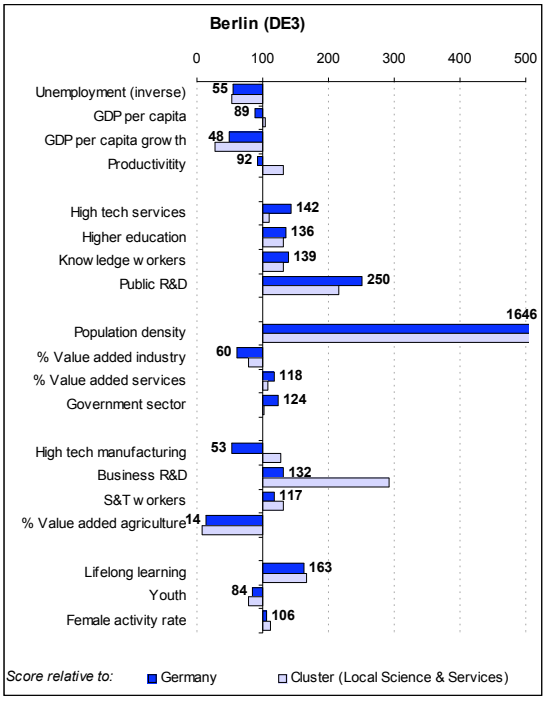

Oberpfalz (DE23)
0 50 100 150 200
Unemployment (inverse) 147
GDP per capita 99
GDP per capita grow th 111
Productivitity 94
High tech services 73
Higher education 74
Know ledge w orkers 76
Public R&D 51
Population density 49
% Value added industry 119
% Value added services 91
Government sector 107
High tech manufacturing 116
Business R&D 107
S&T w orkers 91
% Value added agriculture 160
Lifelong learning 90
Youth 112
Female activity rate 103
Score relative to: Germany Cluster (High Techno)

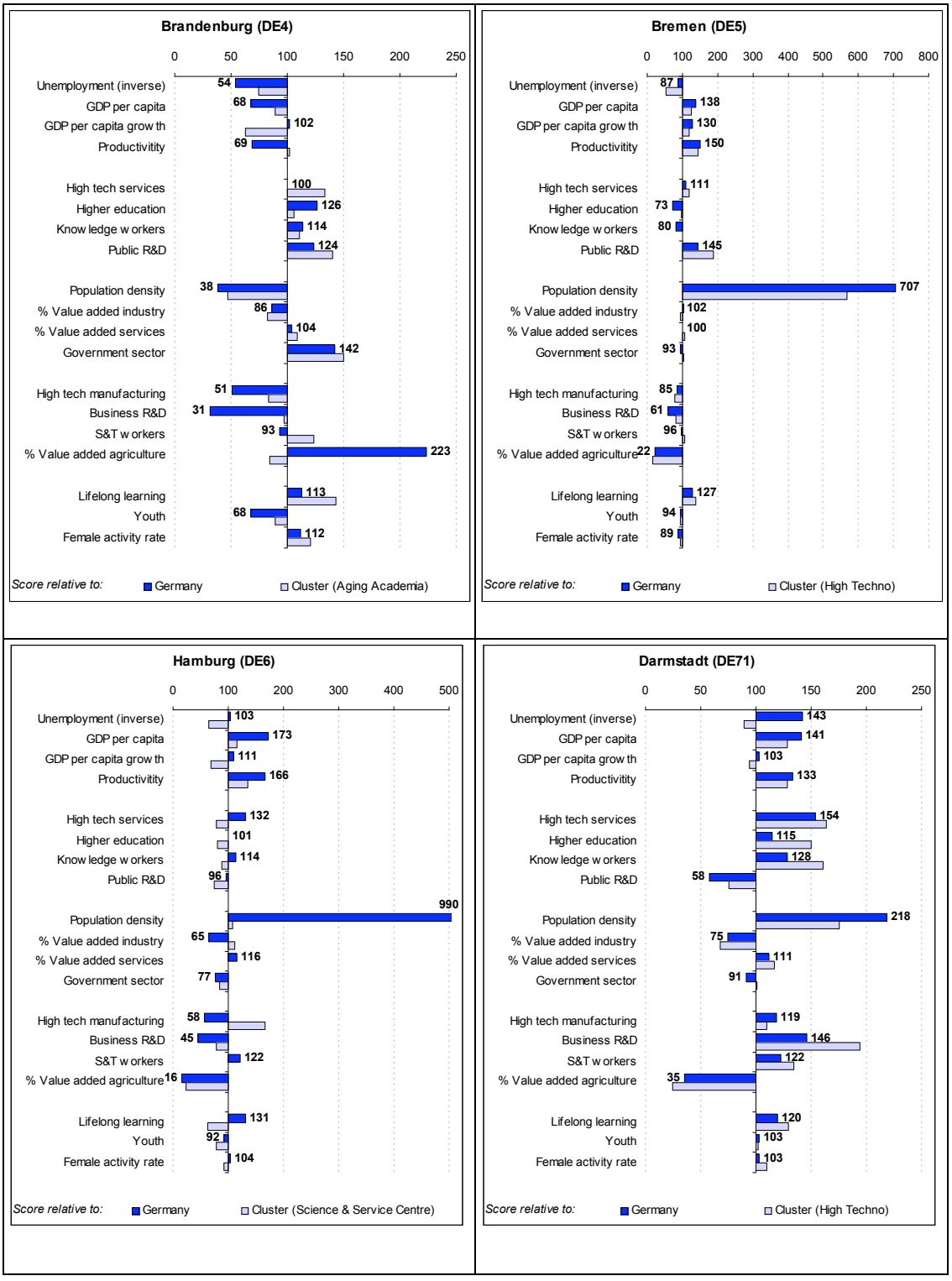

Oberfranken (DE24)
0 20 40 60 80 100 120 140
Unemployment (inverse) 110
GDP per capita 97
GDP per capita grow th 90
Productivitity 94
High tech services 63
Higher education 72
Know ledge w orkers 67
Public R&D 41
Population density 67
% Value added industry 126
% Value added services 89
Government sector 87
High tech manufacturing 112
Business R&D 54
S&T w orkers 83
% Value added agriculture 114
Lifelong learning 83
Youth 105
Female activity rate 107
Score relative to: Germany Cluster (High Techno)

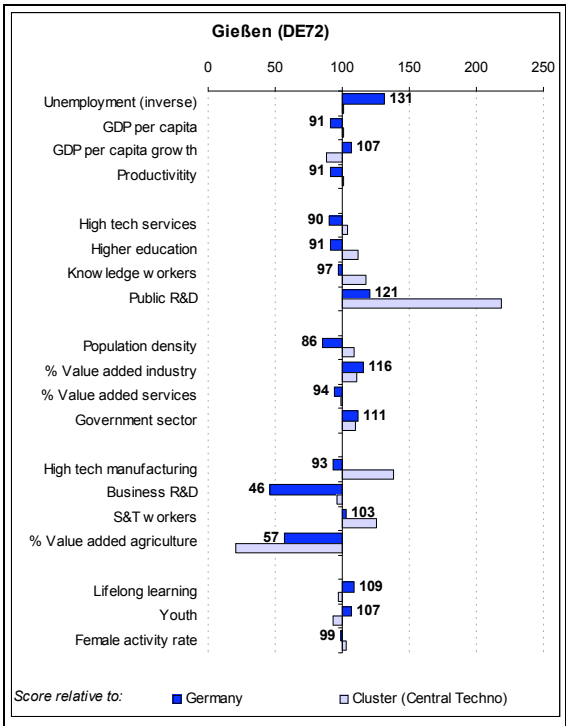

Mittelfranken (DE25)
0
50
100
150
200
250
Unemployment (inverse)
GDP per capita
GDP per capita grow th
Productivitity
High tech services
Higher education
Know ledge w orkers
Public R&D
Population density
% Value added industry
% Value added services
Government sector
High tech manufacturing
Business R&D
S&T w orkers
% Value added agriculture
Lifelong learning
Youth
Female activity rate
131
113
92
108
114
90
85
76
102
103
99
81
126
150
95
84
91
106
104
Score relative to:
Germany
Cluster (High Techno)

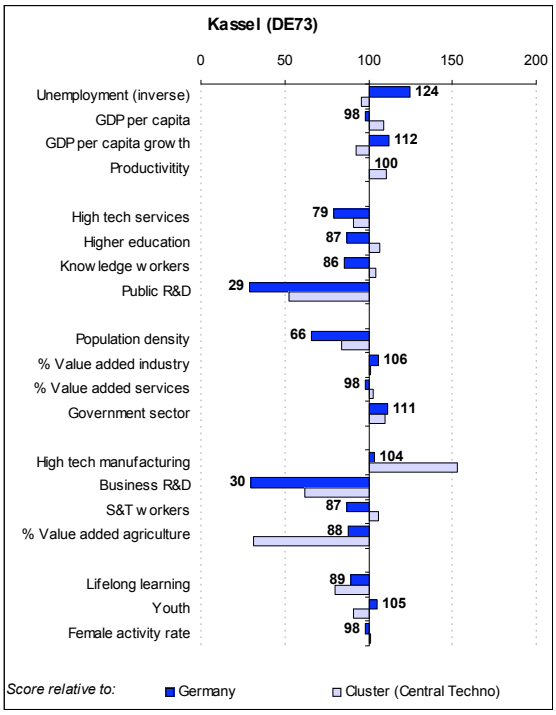

Unterfranken (DE26)
0
50
100
150
200
Unemployment (inverse)
GDP per capita
GDP per capita grow th
Productivitity
High tech services
Higher education
Know ledge w orkers
Public R&D
Population density
% Value added industry
% Value added services
Government sector
High tech manufacturing
Business R&D
S&T w orkers
% Value added agriculture
Lifelong learning
Youth
Female activity rate
154
97
98
92
67
82
83
75
68
117
92
90
137
89
93
149
93
110
100
Score relative to:
Germany
Cluster (High Techno)

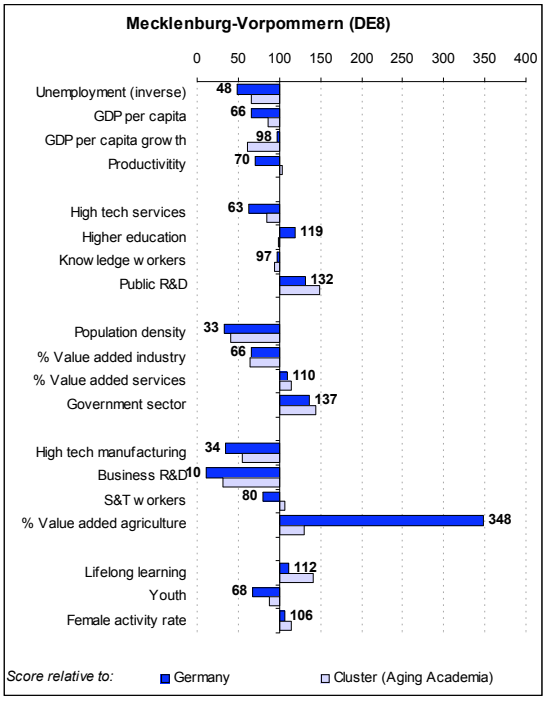

Schwaben (DE27)
0
50
100
150
200
Unemployment (inverse)
GDP per capita
GDP per capita grow th
Productivitity
High tech services
Higher education
Know ledge w orkers
Public R&D
Population density
% Value added industry
% Value added services
Government sector
High tech manufacturing
Business R&D
S&T w orkers
% Value added agriculture
Lifelong learning
Youth
Female activity rate
167
101
96
94
75
92
90
11
77
125
89
96
121
58
96
130
100
115
105
Score relative to:
Germany
Cluster (High Techno)

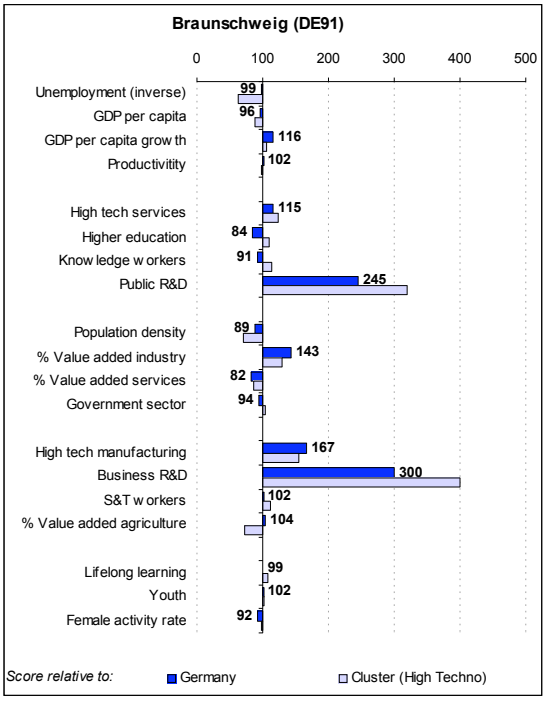

Berlin (DE3)
0
100
200
300
400
500
Unemployment (inverse)
GDP per capita
GDP per capita grow th
Productivitity
High tech services
Higher education
Know ledge w orkers
Public R&D
Population density
% Value added industry
% Value added services
Government sector
High tech manufacturing
Business R&D
S&T w orkers
% Value added agriculture
Lifelong learning
Youth
Female activity rate
55
89
48
92
142
136
139
250
1646
60
118
124
53
132
117
14
163
84
106
Score relative to:
Germany
Cluster (Local Science & Services)

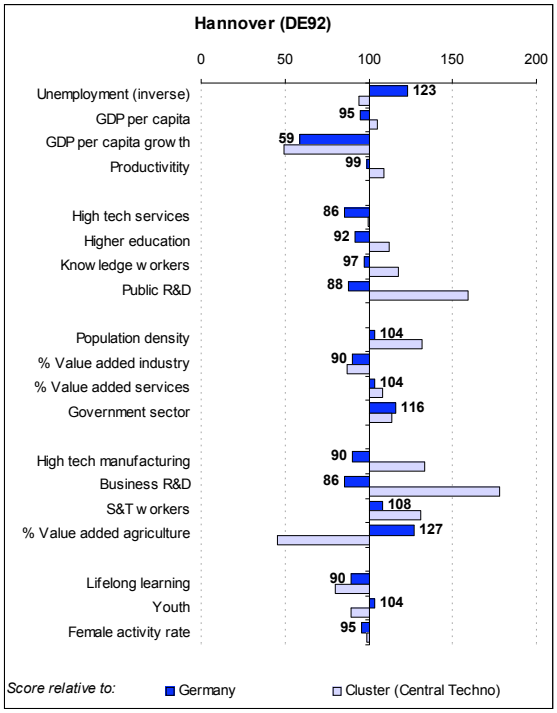

Brandenburg (DE4)
0 50 100 150 200 250
Unemployment (inverse) 54
GDP per capita 68
GDP per capita grow th 102
Productivitity 69
High tech services 100
Higher education 126
Know ledge w orkers 114
Public R&D 124
Population density 38
% Value added industry 86
% Value added services 104
Government sector 142
High tech manufacturing 51
Business R&D 31
S&T w orkers 93
% Value added agriculture 223
Lifelong learning 113
Youth 68
Female activity rate 112
Score relative to: Germany Cluster (Aging Academia)
Bremen (DE5)
0 100 200 300 400 500 600 700 800
Unemployment (inverse) 87
GDP per capita 138
GDP per capita grow th 130
Productivitity 150
High tech services 111
Higher education 73
Know ledge w orkers 80
Public R&D 145
Population density 707
% Value added industry 102
% Value added services 100
Government sector 93
High tech manufacturing 85
Business R&D 61
S&T w orkers 96
% Value added agriculture 22
Lifelong learning 127
Youth 94
Female activity rate 89
Score relative to: Germany Cluster (High Techno)
Hamburg (DE6)
0 100 200 300 400 500
Unemployment (inverse) 103
GDP per capita 173
GDP per capita grow th 111
Productivitity 166
High tech services 132
Higher education 101
Know ledge w orkers 114
Public R&D 96
Population density 990
% Value added industry 65
% Value added services 116
Government sector 77
High tech manufacturing 58
Business R&D 45
S&T w orkers 122
% Value added agriculture 16
Lifelong learning 131
Youth 92
Female activity rate 104
Score relative to: Germany Cluster (Science & Service Centre)
Darmstadt (DE71)
0 50 100 150 200 250
Unemployment (inverse) 143
GDP per capita 141
GDP per capita grow th 103
Productivitity 133
High tech services 154
Higher education 115
Know ledge w orkers 128
Public R&D 58
Population density 218
% Value added industry 75
% Value added services 111
Government sector 91
High tech manufacturing 119
Business R&D 146
S&T w orkers 122
% Value added agriculture 35
Lifelong learning 120
Youth 103
Female activity rate 103
Score relative to: Germany Cluster (High Techno)

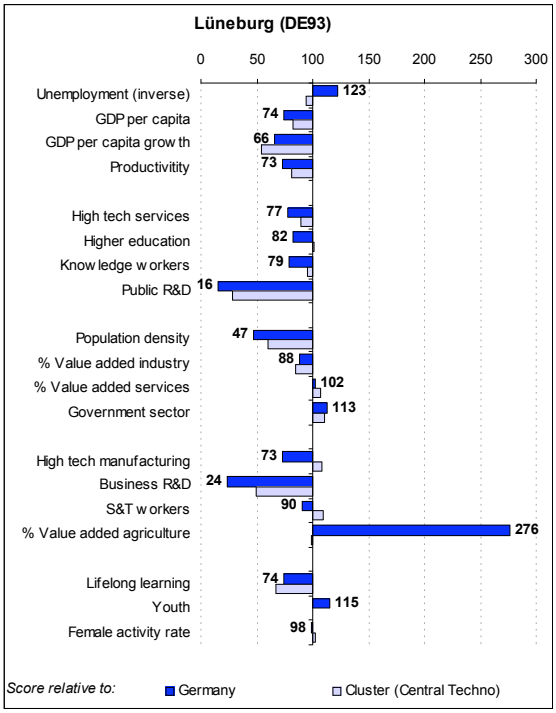

Gießen (DE72)
0 50 100 150 200 250
Unemployment (inverse) 131
GDP per capita 91
GDP per capita grow th 107
Productivitity 91
High tech services 90
Higher education 91
Know ledge w orkers 97
Public R&D 121
Population density 86
% Value added industry 116
% Value added services 94
Government sector 111
High tech manufacturing 93
Business R&D 46
S&T w orkers 103
% Value added agriculture 57
Lifelong learning 109
Youth 107
Female activity rate 99
Score relative to: Germany Cluster (Central Techno)

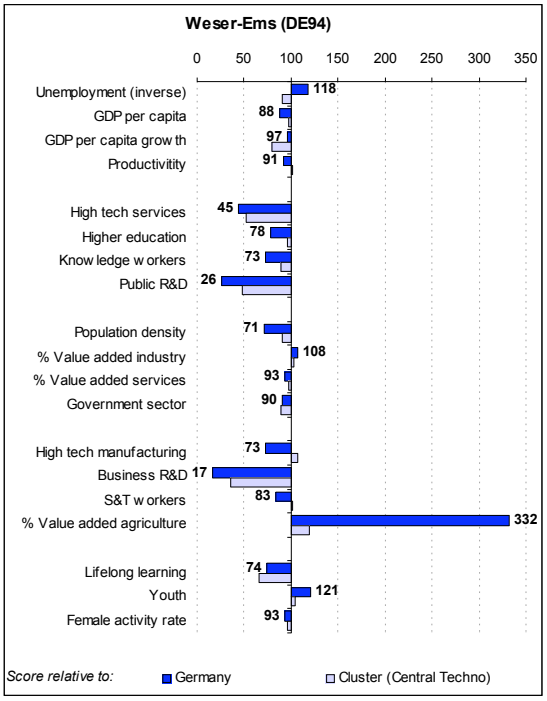

Kassel (DE73)
0 50 100 150 200
Unemployment (inverse) 124
GDP per capita 98
GDP per capita grow th 112
Productivitity 100
High tech services 79
Higher education 87
Know ledge w orkers 86
Public R&D 29
Population density 66
% Value added industry 106
% Value added services 98
Government sector 111
High tech manufacturing 104
Business R&D 30
S&T w orkers 87
% Value added agriculture 88
Lifelong learning 89
Youth 105
Female activity rate 98
Score relative to: Germany Cluster (Central Techno)

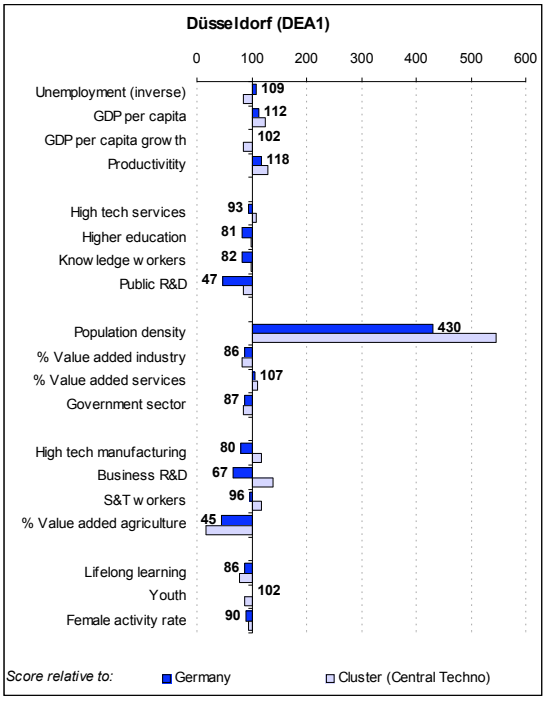

Mecklenburg-Vorpommern (DE8)
0 50 100 150 200 250 300 350 400
Unemployment (inverse) 48
GDP per capita 66
GDP per capita grow th 98
Productivitity 70
High tech services 63
Higher education 119
Know ledge w orkers 97
Public R&D 132
Population density 33
% Value added industry 66
% Value added services 110
Government sector 137
High tech manufacturing 34
Business R&D 10
S&T w orkers 80
% Value added agriculture 348
Lifelong learning 112
Youth 68
Female activity rate 106
Score relative to: Germany Cluster (Aging Academia)

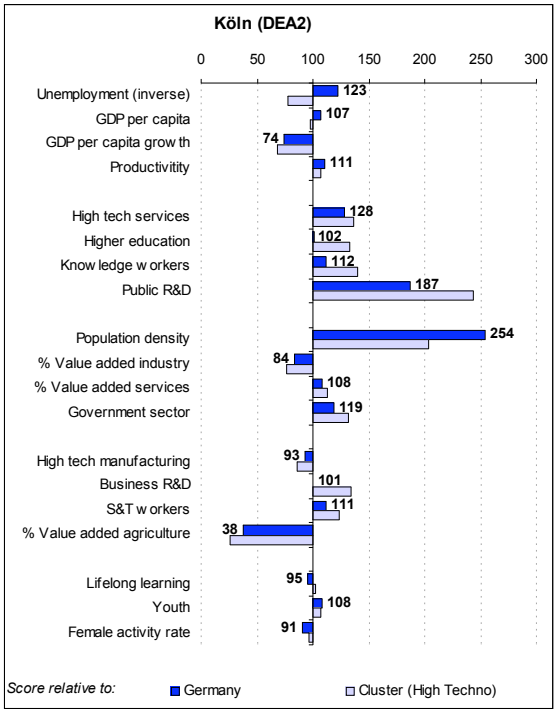

Braunschweig (DE91)
0 100 200 300 400 500
Unemployment (inverse) 99
GDP per capita 96
GDP per capita grow th 116
Productivitity 102
High tech services 115
Higher education 84
Know ledge w orkers 91
Public R&D 245
Population density 89
% Value added industry 143
% Value added services 82
Government sector 94
High tech manufacturing 167
Business R&D 300
S&T w orkers 102
% Value added agriculture 104
Lifelong learning 99
Youth 102
Female activity rate 92
Score relative to: Germany Cluster (High Techno)

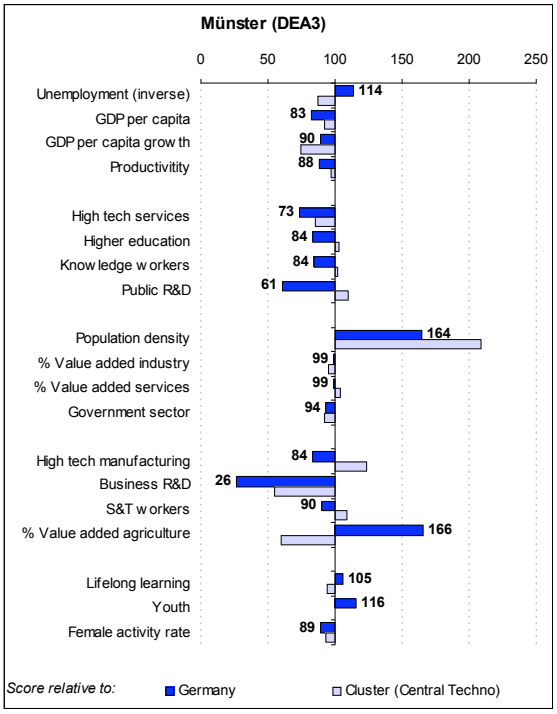

Hannover (DE92)
0
50
100
150
200
Unemployment (inverse) 123
GDP per capita 95
GDP per capita grow th 59
Productivitity 99
High tech services 86
Higher education 92
Know ledge w orkers 97
Public R&D 88
Population density 104
% Value added industry 90
% Value added services 104
Government sector 116
High tech manufacturing 90
Business R&D 86
S&T w orkers 108
% Value added agriculture 127
Lifelong learning 90
Youth 104
Female activity rate 95
Score relative to:
Germany
Cluster (Central Techno)

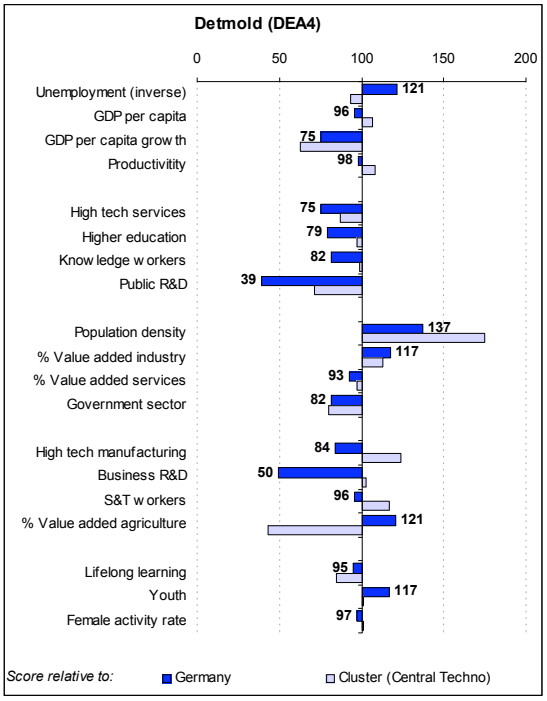

Lüneburg (DE93)
0
50
100
150
200
250
300
Unemployment (inverse) 123
GDP per capita 74
GDP per capita grow th 66
Productivitity 73
High tech services 77
Higher education 82
Know ledge w orkers 79
Public R&D 16
Population density 47
% Value added industry 88
% Value added services 102
Government sector 113
High tech manufacturing 73
Business R&D 24
S&T w orkers 90
% Value added agriculture 276
Lifelong learning 74
Youth 115
Female activity rate 98
Score relative to:
Germany
Cluster (Central Techno)

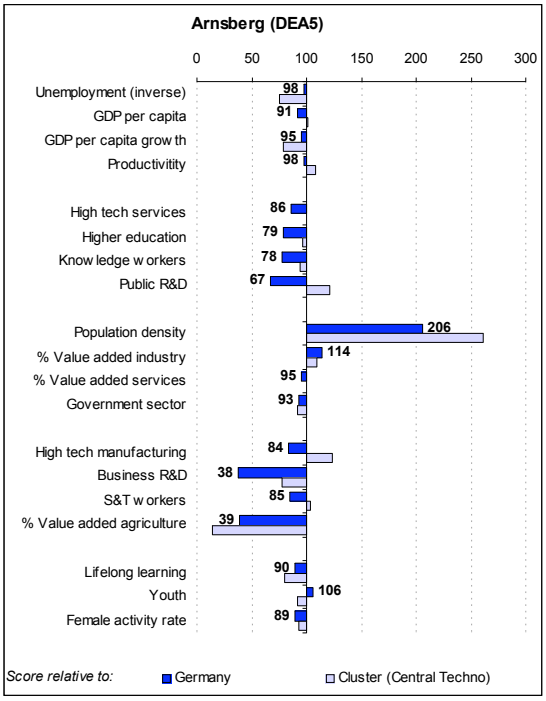

Weser-Ems (DE94)
0
50
100
150
200
250
300
350
Unemployment (inverse) 118
GDP per capita 88
GDP per capita grow th 97
Productivitity 91
High tech services 45
Higher education 78
Know ledge w orkers 73
Public R&D 26
Population density 71
% Value added industry 108
% Value added services 93
Government sector 90
High tech manufacturing 73
Business R&D 17
S&T w orkers 83
% Value added agriculture 332
Lifelong learning 74
Youth 121
Female activity rate 93
Score relative to:
Germany
Cluster (Central Techno)

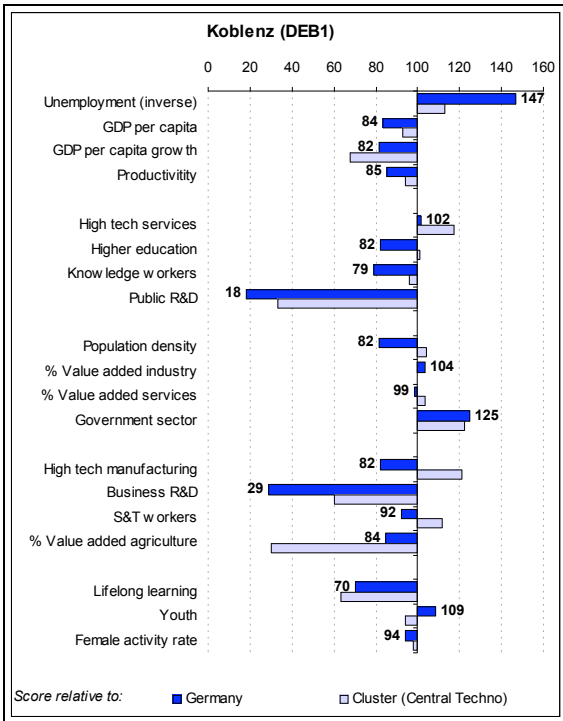

Düsseldorf (DEA1)
0
100
200
300
400
500
600
Unemployment (inverse) 109
GDP per capita 112
GDP per capita grow th 102
Productivitity 118
High tech services 93
Higher education 81
Know ledge w orkers 82
Public R&D 47
Population density 430
% Value added industry 86
% Value added services 107
Government sector 87
High tech manufacturing 80
Business R&D 67
S&T w orkers 96
% Value added agriculture 45
Lifelong learning 86
Youth 102
Female activity rate 90
Score relative to:
Germany
Cluster (Central Techno)

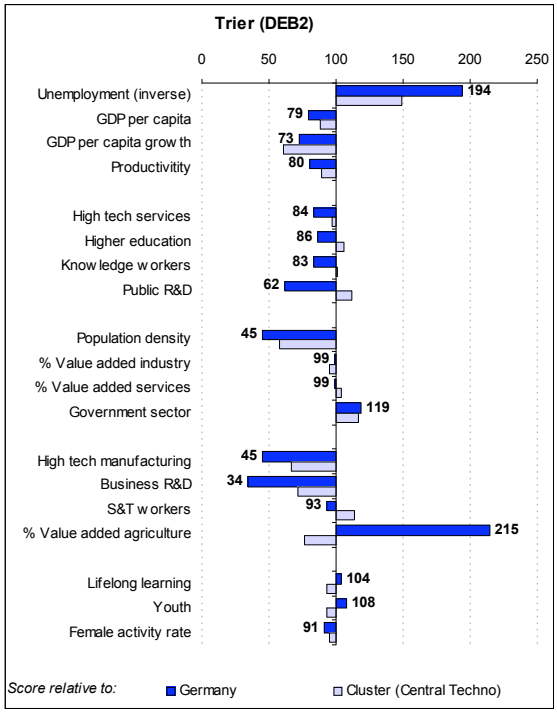

Köln (DEA2)
0 50 100 150 200 250 300
Unemployment (inverse) 123
GDP per capita 107
GDP per capita grow th 74
Productivitity 111
High tech services 128
Higher education 102
Know ledge w orkers 112
Public R&D 187
Population density 254
% Value added industry 84
% Value added services 108
Government sector 119
High tech manufacturing 93
Business R&D 101
S&T w orkers 111
% Value added agriculture 38
Lifelong learning 95
Youth 108
Female activity rate 91
Score relative to:
Germany
Cluster (High Techno)

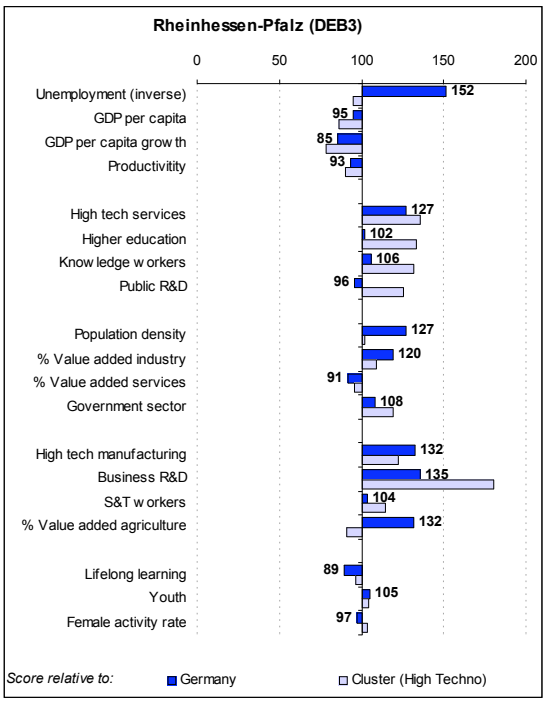

Münster (DEA3)
0 50 100 150 200 250
Unemployment (inverse) 114
GDP per capita 83
GDP per capita grow th 90
Productivitity 88
High tech services 73
Higher education 84
Know ledge w orkers 84
Public R&D 61
Population density 164
% Value added industry 99
% Value added services 99
Government sector 94
High tech manufacturing 84
Business R&D 26
S&T w orkers 90
% Value added agriculture 166
Lifelong learning 105
Youth 116
Female activity rate 89
Score relative to:
Germany
Cluster (Central Techno)

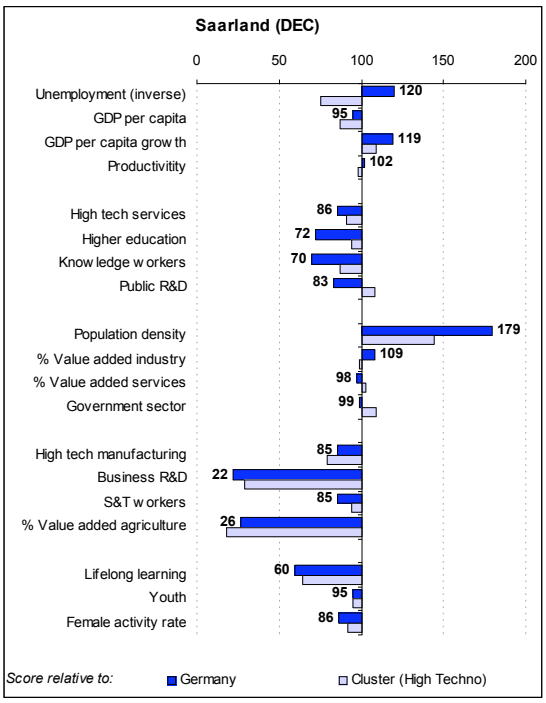

Detmold (DEA4)
0 50 100 150 200
Unemployment (inverse) 121
GDP per capita 96
GDP per capita grow th 75
Productivitity 98
High tech services 75
Higher education 79
Know ledge w orkers 82
Public R&D 39
Population density 137
% Value added industry 117
% Value added services 93
Government sector 82
High tech manufacturing 84
Business R&D 50
S&T w orkers 96
% Value added agriculture 121
Lifelong learning 95
Youth 117
Female activity rate 97
Score relative to:
Germany
Cluster (Central Techno)

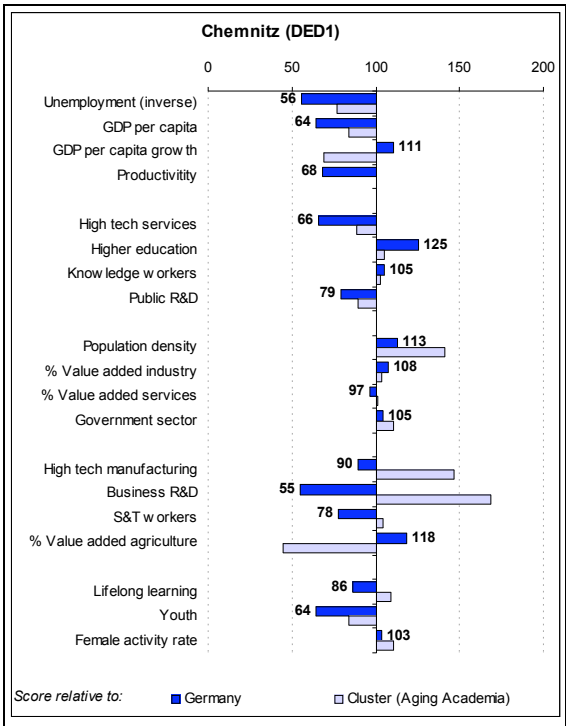

Arnsberg (DEA5)
0 50 100 150 200 250 300
Unemployment (inverse) 98
GDP per capita 91
GDP per capita grow th 95
Productivitity 98
High tech services 86
Higher education 79
Know ledge w orkers 78
Public R&D 67
Population density 206
% Value added industry 114
% Value added services 95
Government sector 93
High tech manufacturing 84
Business R&D 38
S&T w orkers 85
% Value added agriculture 39
Lifelong learning 90
Youth 106
Female activity rate 89
Score relative to:
Germany
Cluster (Central Techno)

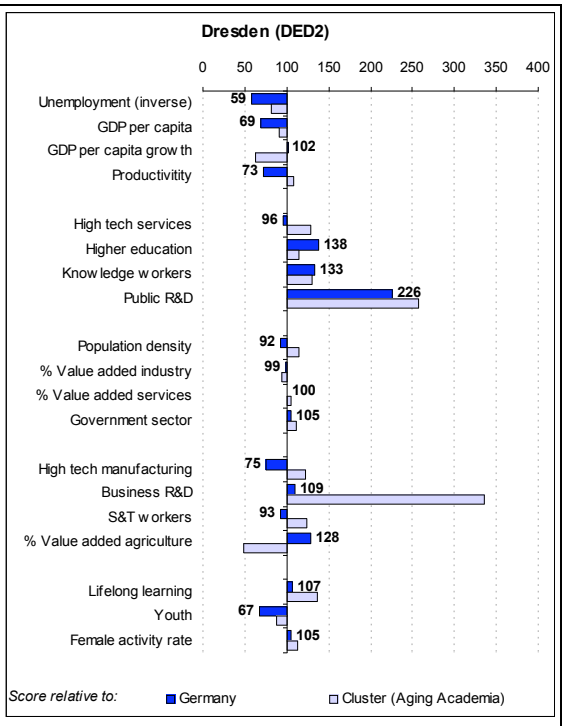

Koblenz (DEB1)
0 20 40 60 80 100 120 140 160
Unemployment (inverse) 147
GDP per capita 84
GDP per capita grow th 82
Productivitity 85
High tech services 102
Higher education 82
Know ledge w orkers 79
Public R&D 18
Population density 82
% Value added industry 104
% Value added services 99
Government sector 125
High tech manufacturing 82
Business R&D 29
S&T w orkers 92
% Value added agriculture 84
Lifelong learning 70
Youth 109
Female activity rate 94
Score relative to:
Germany
Cluster (Central Techno)

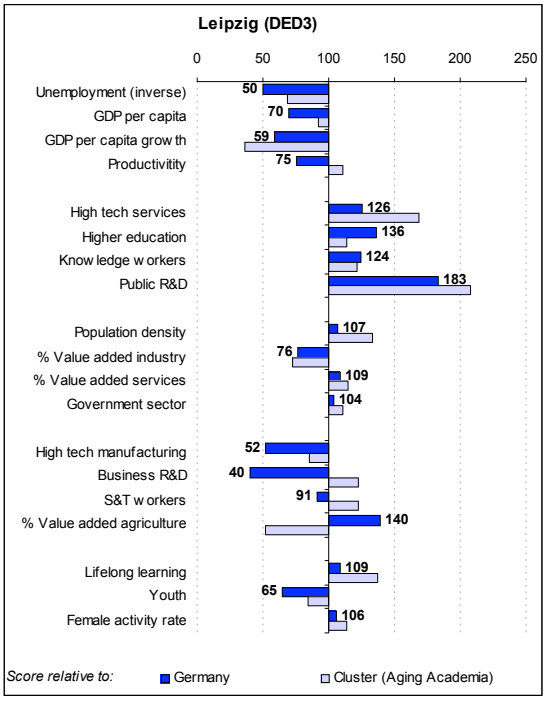

Trier (DEB2)
0 50 100 150 200 250
Unemployment (inverse) 194
GDP per capita 79
GDP per capita grow th 73
Productivitity 80
High tech services 84
Higher education 86
Know ledge w orkers 83
Public R&D 62
Population density 45
% Value added industry 99
% Value added services 99
Government sector 119
High tech manufacturing 45
Business R&D 34
S&T w orkers 93
% Value added agriculture 215
Lifelong learning 104
Youth 108
Female activity rate 91
Score relative to:
Germany
Cluster (Central Techno)

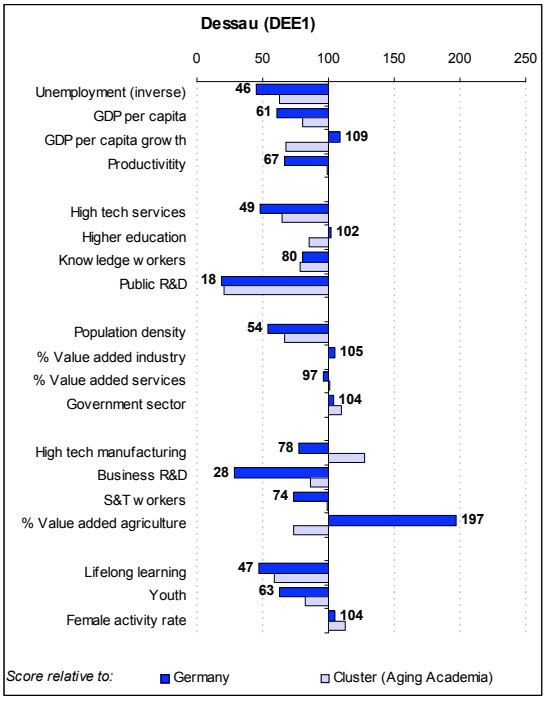

Rheinhessen-Pfalz (DEB3)
0 50 100 150 200
Unemployment (inverse) 152
GDP per capita 95
GDP per capita grow th 85
Productivitity 93
High tech services 127
Higher education 102
Know ledge w orkers 106
Public R&D 96
Population density 127
% Value added industry 120
% Value added services 91
Government sector 108
High tech manufacturing 132
Business R&D 135
S&T w orkers 104
% Value added agriculture 132
Lifelong learning 89
Youth 105
Female activity rate 97
Score relative to:
Germany
Cluster (High Techno)

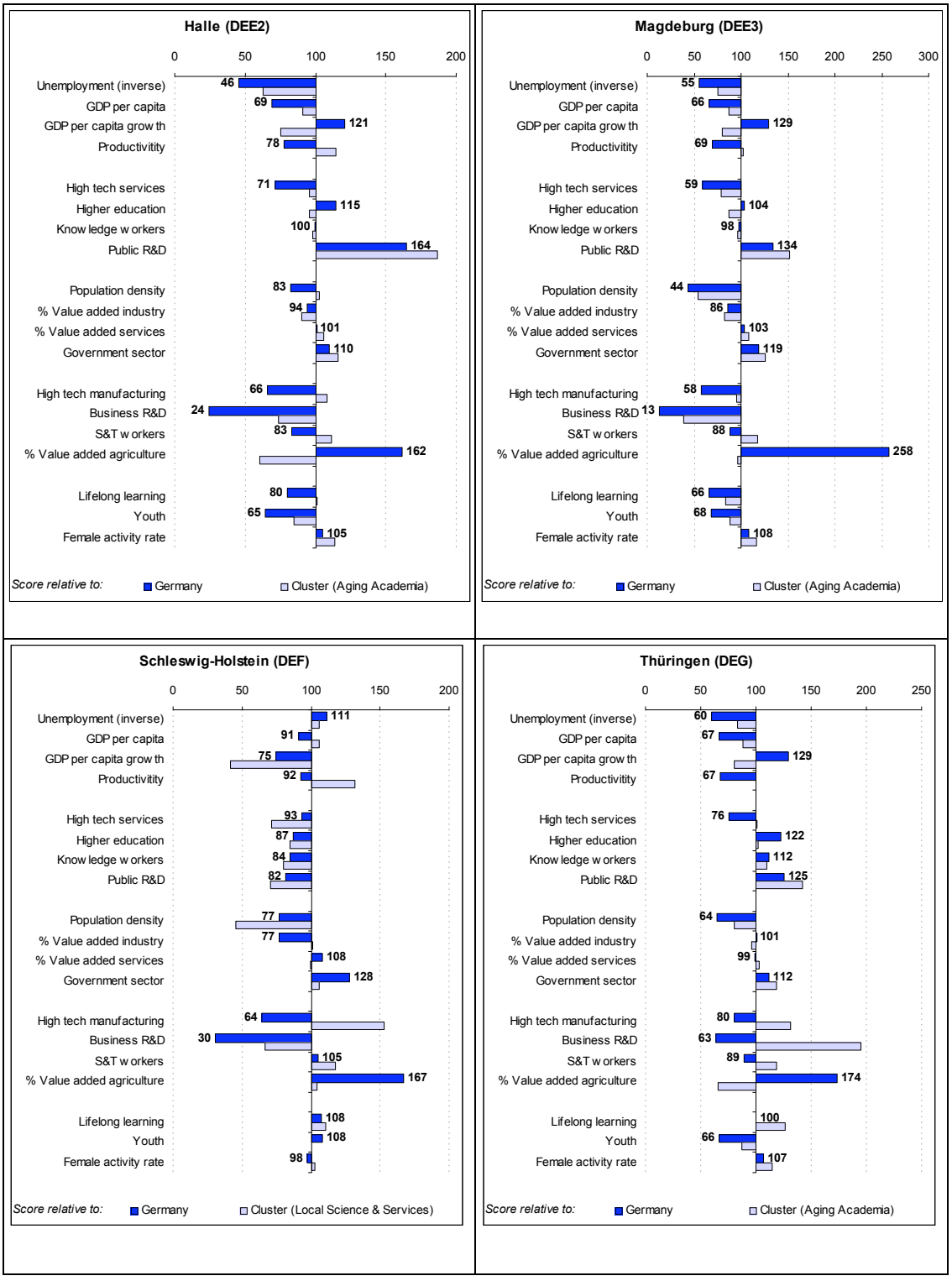

Saarland (DEC)
0 50 100 150 200
Unemployment (inverse) 120
GDP per capita 95
GDP per capita grow th 119
Productivitity 102
High tech services 86
Higher education 72
Know ledge w orkers 70
Public R&D 83
Population density 179
% Value added industry 109
% Value added services 98
Government sector 99
High tech manufacturing 85
Business R&D 22
S&T w orkers 85
% Value added agriculture 26
Lifelong learning 60
Youth 95
Female activity rate 86
Score relative to:
Germany
Cluster (High Techno)


Chemnitz (DED1)
0 50 100 150 200
Unemployment (inverse) 56
GDP per capita 64
GDP per capita grow th 111
Productivitity 68
High tech services 66
Higher education 125
Know ledge w orkers 105
Public R&D 79
Population density 113
% Value added industry 108
% Value added services 97
Government sector 105
High tech manufacturing 90
Business R&D 55
S&T w orkers 78
% Value added agriculture 118
Lifelong learning 86
Youth 64
Female activity rate 103
Score relative to: Germany Cluster (Aging Academia)


Dresden (DED2)
0 50 100 150 200 250 300 350 400
Unemployment (inverse) 59
GDP per capita 69
GDP per capita grow th 102
Productivitity 73
High tech services 96
Higher education 138
Know ledge w orkers 133
Public R&D 226
Population density 92
% Value added industry 99
% Value added services 100
Government sector 105
High tech manufacturing 75
Business R&D 109
S&T w orkers 93
% Value added agriculture 128
Lifelong learning 107
Youth 67
Female activity rate 105
Score relative to: Germany Cluster (Aging Academia)


Leipzig (DED3)
0 50 100 150 200 250
Unemployment (inverse) 50
GDP per capita 70
GDP per capita grow th 59
Productivitity 75
High tech services 126
Higher education 136
Know ledge w orkers 124
Public R&D 183
Population density 107
% Value added industry 76
% Value added services 109
Government sector 104
High tech manufacturing 52
Business R&D 40
S&T w orkers 91
% Value added agriculture 140
Lifelong learning 109
Youth 65
Female activity rate 106
Score relative to: Germany Cluster (Aging Academia)


Dessau (DEE1)
0 50 100 150 200 250
Unemployment (inverse) 46
GDP per capita 61
GDP per capita grow th 109
Productivitity 67
High tech services 49
Higher education 102
Know ledge w orkers 80
Public R&D 18
Population density 54
% Value added industry 105
% Value added services 97
Government sector 104
High tech manufacturing 78
Business R&D 28
S&T w orkers 74
% Value added agriculture 197
Lifelong learning 47
Youth 63
Female activity rate 104
Score relative to: Germany Cluster (Aging Academia)


Halle (DEE2)
0 50 100 150 200
Unemployment (inverse) 46
GDP per capita 69
GDP per capita grow th 121
Productivitity 78
High tech services 71
Higher education 115
Know ledge w orkers 100
Public R&D 164
Population density 83
% Value added industry 94
% Value added services 101
Government sector 110
High tech manufacturing 66
Business R&D 24
S&T w orkers 83
% Value added agriculture 162
Lifelong learning 80
Youth 65
Female activity rate 105
Score relative to: Germany Cluster (Aging Academia)
Magdeburg (DEE3)
0 50 100 150 200 250 300
Unemployment (inverse) 55
GDP per capita 66
GDP per capita grow th 129
Productivitity 69
High tech services 59
Higher education 104
Know ledge w orkers 98
Public R&D 134
Population density 44
% Value added industry 86
% Value added services 103
Government sector 119
High tech manufacturing 58
Business R&D 13
S&T w orkers 88
% Value added agriculture 258
Lifelong learning 66
Youth 68
Female activity rate 108
Score relative to: Germany Cluster (Aging Academia)
Schleswig-Holstein (DEF)
0 50 100 150 200
Unemployment (inverse) 111
GDP per capita 91
GDP per capita grow th 75
Productivitity 92
High tech services 93
Higher education 87
Know ledge w orkers 84
Public R&D 82
Population density 77
% Value added industry 77
% Value added services 108
Government sector 128
High tech manufacturing 64
Business R&D 30
S&T w orkers 105
% Value added agriculture 167
Lifelong learning 108
Youth 108
Female activity rate 98
Score relative to: Germany Cluster (Local Science & Services)
Thüringen (DEG)
0 50 100 150 200 250
Unemployment (inverse) 60
GDP per capita 67
GDP per capita grow th 129
Productivitity 67
High tech services 76
Higher education 122
Know ledge w orkers 112
Public R&D 125
Population density 64
% Value added industry 101
% Value added services 99
Government sector 112
High tech manufacturing 80
Business R&D 63
S&T w orkers 89
% Value added agriculture 174
Lifelong learning 100
Youth 66
Female activity rate 107
Score relative to: Germany Cluster (Aging Academia)

Appendix C Categories used for policy-mix analysis

C.1 Classification of policy areas

Policy area	Short description
Improving governance capacities for innovation and knowledge policies	Technical assistance type funding used by public authorities, regional agencies and public-private partnerships in developing and improving policies and strategies in support of innovation and knowledge. This could include past ERDF innovative action programmes as well as support for instance for regional foresight, etc.
Innovation friendly environment;	This category covers a range of actions which seek to improve the overall environment in which enterprises innovate, and notably three sub groups: innovation financing (in terms of establishing financial engineering schemes, etc.); regulatory improvements and innovative approaches to public services and procurement (this category could notably capture certain e-government investments related to provision of services to enterprises) ; Developing human capital for the knowledge economy. This category will be limited to projects in higher education aimed at developing industry orientated courses and post-graduate courses; training of researchers in enterprises or research centres[34];
Knowledge transfer and technology diffusion to enterprises	Direct or indirect support for knowledge and technology transfer: direct support: aid scheme for utilising technology-related services or for implementing technology transfer projects, notably environmentally friendly technologies and ITC; indirect support: delivered through funding of infrastructure and services of technology parks, innovation centres, university liaison and transfer offices, etc.
Innovation poles and clusters	Direct or indirect support for creation of poles (involving public and non-profit organisations as well as enterprises) and clusters of companies direct support: funding for enterprise level cluster activities, etc. indirect support through funding for regrouping R&D infrastructure in poles, infrastructure for clusters, etc.
Support to creation and growth of innovative enterprises	Direct or indirect support for creation and growth of innovative firms: direct support: specific financial schemes for spin-offs and innovative start-ups, grants to SMEs related to improving innovation management, marketing, industrial design, etc.; indirect support through funding of incubators, training related to entrepreneurship, etc.
Boosting applied research and product development	Funding of "Pre-competitive development" and "Industrial research" projects and related infrastructure. Policy instruments include: aid schemes for single beneficiary or groups of beneficiaries (including IPR protection and exploitation); research infrastructures for non-profit/public organisations and higher education sector directly related to universities.

[34] This is part of the wider area of in-house training, but in the present study only the interventions targeted to researchers or research functions will be analysed.

C.2 Classification of Beneficiaries:

Beneficiaries	Short description
Public sectors	Universities National research institutions and other national and local public bodies (innovation agencies, BIC, Chambers of Commerce, etc..) Public companies
Private sectors	Enterprises Private research centres
Networks	cooperation between research, universities and businesses cooperation between businesses (*clusters of SMEs)* other forms of cooperation among different actors

C.3 Classification of instruments:

Instruments	Short description
Infrastructures and facilities	Building and equipment for laboratories or facilities for university or research centres, Telecommunication infrastructures, Building and equipment for incubators and parks for innovative enterprises
Aid schemes	Grants and loans for RTDI projects Innovative finance (venture capital, equity finance, special bonds, etc.) for innovative enterprises
Education and training	Graduate and post-graduate University courses Training of researchers

Appendix D Financial and policy measure tables

D.1 Additional financial tables

D 1.1 RTDI plus business (innovation technology) support

The following table uses a braoder definition of RTDI funds than the one used in the report. Figures include: categories 181 to 184 plus
152 Environment-friendly technologies, clean and economical energy technologies
153 Business organisation advisory service (including internationalisation, exporting and environmental management, purchase of technology)
155 Financial engineering
162 Environment-friendly technologies, clean and economical energy technologies
163 Enterprise advisory service (information, business planning, consultancy services, marketing, management, design, internationalisation, exporting, environmental management, purchase of technology)
164 Shared business services (business estates, incubator units, stimulation, promotional services, networking, conferences, trade fairs)
165 Financial engineering

Exhibit D.1.1.1: Overall allocation of resources at an objective 1 and 2 level (allocated Euro): enlarged definition of RTDI

Objective	Total cost	SF			NF	
		Total	ERDF	ESF	Public	Private
RTDI INTERVENTIONS						
Objective 1	3.086.836.242,74	1.965.661.343,43	1.965.661.343,43	0,00	1.121.174.899,31	0,00
Objective 2	2.010.431.178,96	969.650.739,98	969.650.739,98	0,00	971.892.720,13	68.887.718,85
TOTAL COHESION POLICY						
Objective 1	33.838.455.223,00	21.466.713.600,00	11.897.273.381,00	6.035.876.494,00	12.164.324.744,00	207.416.879,00
Objective 2	9.742.474.663,00	3.784.986.005,00	3.269.686.230,00	515.299.775,00	3.950.151.257,00	2.007.337.401,00
* the two digit code 15 was not taken into accout to avoid overestimate (PO OBJ 1 SACHSEN-ANHALT)						
** the two digit code 16 was not taken into accout to avoid overestimate (PO OBJ 1 SACHSEN-ANHALT)						

Exhibit D.1.1.2: Regional allocation of resources (Euro): enlarged definition of RTDI

Programs	RTDI INTERVENTIONS			TOTAL		
	Total SF	ERDF	ESF	Total SF	ERDF	ESF
OBJECTIVE 1						
PO OBJ 1 BERLIN (OST)	72.097.690,00	72.097.690,00	0,00	716.991.000,00	519.537.000,00	190.135.000,00
PO OBJ 1 MECKLENBURG-VORPOMMERN	101.352.309,38	101.352.309,38	0,00	2.562.311.144,00	1.250.245.344,00	638.370.000,00
PO OBJ 1 SACHSEN-ANHALT	357.916.375,05	357.916.375,05	0,00	3.500.445.500,00	1.991.342.291,00	746.254.000,00
PO OBJ 1 THURINGEN	344.385.284,00	344.385.284,00	0,00	3.011.136.800,00	1.566.290.432,00	882.700.000,00
PO obj. Sachsen	764.720.402,00	764.720.402,00	0,00	5.070.610.000,00	3.269.598.314,00	1.098.190.494,00
PO OBJ1 BRANDENBURG	325.189.283,00	325.189.283,00	0,00	3.090.222.000,00	1.639.260.000,00	730.660.000,00
OBJECTIVE 2						
DOCUP obj. 2 Baden-Württemberg	10.218.240,00	10.218.240,00	0,00	102.070.000,00	102.070.000,00	0,00
DOCUP obj. 2 Bayern	59.032.187,45	59.032.187,45	0,00	560.458.000,00	499.624.351,00	60.833.649,00
DOCUP obj. 2 Berlin	55.012.300,00	55.012.300,00	0,00	401.289.000,00	246.426.000,00	154.863.000,00
DOCUP obj. 2 Bremen	49.880.224,00	49.880.224,00	0,00	117.962.000,00	117.962.000,00	0,00
DOCUP obj. 2 Hessen	56.000.755,00	56.000.755,00	0,00	191.555.000,00	191.555.000,00	0,00
DOCUP obj. 2 Niedersachsen	170.732.230,00	170.732.230,00	0,00	766.019.000,00	712.020.000,00	53.999.000,00
DOCUP obj. 2 Nordrhein-Westfalen	400.565.036,30	400.565.036,30	0,00	1.012.824.995,00	859.683.777,00	153.141.218,00
DOCUP obj. 2 Rheiland-Pfalz	70.403.080,89	70.403.080,89	0,00	178.198.000,00	165.861.000,00	12.337.000,00
DOCUP obj. 2 Schleswig-Holstein	55.602.833,00	55.602.833,00	0,00	269.595.000,00	231.472.092,00	38.122.908,00
Hamburg	1.835.103,34	1.835.103,34	0,00	6.448.010,00	6.448.010,00	0,00
Saarland	40.368.750,00	40.368.750,00	0,00	178.567.000,00	136.564.000,00	42.003.000,00
Total Regional OPs	**2.935.312.083,41**	**2.935.312.083,41**	**0,00**	**21.736.702.449,00**	**13.505.959.611,00**	**4.801.609.269,00**
OBJECTIVE 1						
Bundesprogramm	0,00	0,00	0,00	1.749.567.000,00	0,00	1.749.567.000,00
PO obj. 1 Pêche	0,00	0,00	0,00	104.430.156,00	0,00	0,00
PO obj. 1 Transport	0,00	0,00	0,00	1.661.000.000,00	1.661.000.000,00	0,00
Total Multiregional OPs	**0,00**	**0,00**	**0,00**	**3.514.997.156,00**	**1.661.000.000,00**	**1.749.567.000,00**

Exhibit D 1.1.3: Absorption capacity of RTDI interventions: enlarged definition of RTDI

OBJECTIVES	ALLOCATED	DISBURSED TOTAL SF	EXPENDITURE CAPACITY
Objective 1	1.965.661.343,43	1.077.125.938,94	54,8%
Objective 2	969.650.739,98	486.978.392,46	50,2%

D 1.2 Broad innovation and knowledge economy funding

This third calculation adds RTDI plus business (innovation & technology) support plus information society. As D.1.1 plus:
322 Information and Communication Technology (including security and safe transmission measures)
324 Services and applications for SMEs (electronic commerce and transactions, education and training, networking)

Exhibit D.1.2.1: Overall allocation of resources at an objective 1 and 2 level (allocated Euro): enlarged definition of RTDI and information society

Objective	Total cost	SF			NF	
		Total	ERDF	ESF	Public	Private
RTDI INTERVENTIONS						
Objective 1	3.323.400.004,36	2.112.719.689,27	2.112.719.689,27	0,00	1.210.680.315,10	0,00
Objective 2	2.093.367.022,96	1.011.063.111,98	1.011.063.111,98	0,00	1.010.223.898,63	72.080.012,35
TOTAL COHESION POLICY						
Objective 1	33.838.455.223,00	21.466.713.600,00	11.897.273.381,00	6.035.876.494,00	12.164.324.744,00	207.416.879,00
Objective 2	9.742.474.663,00	3.784.986.005,00	3.269.686.230,00	515.299.775,00	3.950.151.257,00	2.007.337.401,00
* the two digit code 15 was not taken into accout to avoid overestimate (PO OBJ 1 SACHSEN-ANHALT)						
** the two digit code 16 was not taken into accout to avoid overestimate (PO OBJ 1 SACHSEN-ANHALT)						
*** the two digit code 32 has been included (PO obj. Sachsen, PO OBJ1 BRANDENBURG). Figures may be slightly overestimate.						

Exhibit D.1.2.2: Regional allocation of resources (Euro): enlarged definition of RTDI and information society

Programs	RTDI INTERVENTIONS			TOTAL		
	Total SF	ERDF	ESF	Total SF	ERDF	ESF
OBJECTIVE 1						
PO OBJ 1 BERLIN (OST)	100.624.600,00	100.624.600,00	0,00	716.991.000,00	519.537.000,00	190.135.000,00
PO OBJ 1 MECKLENBURG-VORPOMMERN	113.938.875,27	113.938.875,27	0,00	2.562.311.144,00	1.250.245.344,00	638.370.000,00
PO OBJ 1 SACHSEN-ANHALT	379.315.465,00	379.315.465,00	0,00	3.500.445.500,00	1.991.342.291,00	746.254.000,00
PO OBJ 1 THURINGEN	344.385.284,00	344.385.284,00	0,00	3.011.136.800,00	1.566.290.432,00	882.700.000,00
PO obj. Sachsen	788.720.402,00	788.720.402,00	0,00	5.070.610.000,00	3.269.598.314,00	1.098.190.494,00
PO OBJ1 BRANDENBURG	385.735.063,00	385.735.063,00	0,00	3.090.222.000,00	1.639.260.000,00	730.660.000,00
OBJECTIVE 2						
DOCUP obj. 2 Baden-Württemberg	10.218.240,00	10.218.240,00	0,00	102.070.000,00	102.070.000,00	0,00
DOCUP obj. 2 Bayern	59.032.187,45	59.032.187,45	0,00	560.458.000,00	499.624.351,00	60.833.649,00
DOCUP obj. 2 Berlin	64.882.900,00	64.882.900,00	0,00	401.289.000,00	246.426.000,00	154.863.000,00
DOCUP obj. 2 Bremen	59.229.551,00	59.229.551,00	0,00	117.962.000,00	117.962.000,00	0,00
DOCUP obj. 2 Hessen	57.506.386,00	57.506.386,00	0,00	191.555.000,00	191.555.000,00	0,00
DOCUP obj. 2 Niedersachsen	171.806.230,00	171.806.230,00	0,00	766.019.000,00	712.020.000,00	53.999.000,00
DOCUP obj. 2 Nordrhein-Westfalen	412.974.800,30	412.974.800,30	0,00	1.012.824.995,00	859.683.777,00	153.141.218,00
DOCUP obj. 2 Rheiland-Pfalz	70.403.080,89	70.403.080,89	0,00	178.198.000,00	165.861.000,00	12.337.000,00
DOCUP obj. 2 Schleswig-Holstein	62.437.833,00	62.437.833,00	0,00	269.595.000,00	231.472.092,00	38.122.908,00
Hamburg	1.835.103,34	1.835.103,34	0,00	6.448.010,00	6.448.010,00	0,00
Saarland	40.736.800,00	40.736.800,00	0,00	178.567.000,00	136.564.000,00	42.003.000,00
Total Regional OPs	**3.123.782.801,25**	**3.123.782.801,25**	**0,00**	**21.736.702.449,00**	**13.505.959.611,00**	**4.801.609.269,00**
OBJECTIVE 1						
Bundesprogramm	0,00	0,00	0,00	1.749.567.000,00	0,00	1.749.567.000,00
PO obj. 1 Pêche	0,00	0,00	0,00	104.430.156,00	0,00	0,00
PO obj. 1 Transport	0,00	0,00	0,00	1.661.000.000,00	1.661.000.000,00	0,00
Total Multiregional OPs	**0,00**	**0,00**	**0,00**	**3.514.997.156,00**	**1.661.000.000,00**	**1.749.567.000,00**

Exhibit D 1.2.3: Absorption capacity of RTDI interventions: enlarged definition of RTDI and information society

OBJECTIVES	ALLOCATED	DISBURSED TOTAL SF	EXPENDITURE CAPACITY
Objective 1	2.112.719.689,27	1.162.719.853,31	55,0%
Objective 2	1.011.063.111,98	500.441.293,97	49,5%

D.2 Summary of key policy measures per programme

Exhibit 8: main measures in favour of innovation and knowledge

Identified RTDI measure or major project	Focus of intervention (policy areas classification)*	Main Instruments**	Main beneficiaries***
Nordrhein-Westfalen:			
Measure 2.1 (supporting the co-operation between science and industry, in particular Future Contest)	Boosting applied research and product development	Aid schemes	Public sector / universities / private sector
2.5 Media and Communication	Innovation poles and clusters	Infrastructures and facilities	Networks
3.3 Technology- and Qualification infrastructure (in particular MST factory)	Support to creation and growth of innovative enterprises	Infrastructures and facilities	Private sectors
Rheinland-Pfalz:			
Measure 3.1: Innovation and start-up initiative Westpfalz	Support to creation and growth of innovative enterprises	The BIC acts as incubator for young innovative enterprises and counsells and trains young start-ups	Students and young graduates / private enterprises / Business and Innovation Centre (BIC)
Measure: 3.3 Upgrading applied research and technology infrastructure	Boosting applied research and product development	Funding of "Pre-competitive development" and "Industrial research" projects and related infrastructure. Policy instruments include research infrastructures for non-profit/public organisations and higher education sector directly related to universities as well as PPP-research bodies.	Public sector / universities / private sector
Measure 3.4 Support to innovative enterprises active in growth markets	Boosting applied research and product development	Funding of "Pre-competitive development" and "Industrial research" projects and related infrastructure. Policy instruments include research infrastructures for non-profit/public organisations and companies	Public sector (research institutes) / private sector (companies)

Bremen			
Measure 2.1 Information Society (in particular BIBIS – Bremerhavener Institut für Biologische Informationssysteme am TTZ)	Knowledge transfer and technology diffusion enterprises	Infrastructures and facilities	**Public sectors; Private sectors**
Measure 2.2 (Technology Transfer)	Knowledge transfer and technology diffusion enterprises	Infrastructures and facilities	**Public sectors; Private sectors**
Measure 3.1 (Support to demand oriented Environmental Technologies)	Support to creation and growth of innovative enterprises	Aid schemes	**Private sectors**
Objective 1****			
Measure 1.2 (support to the technological and innovative potential in SMEs)	Support to creation and growth of innovative enterprises / Boosting applied research and product development	Infrastructures and facilities; Aid schemes	**Private sectors / Public sectors**
Measure 2.2 (upgrading science and R&D infrastructures, information society)	Knowledge transfer and technology diffusion to enterprises / Boosting applied research and product development	Infrastructures and facilities	**Public Sectors**
Measure 2.3.(upgrading further education infrastructure): high support in Sachsen-Anhalt, Berlin and Brandenburg.	Knowledge transfer and technology diffusion to enterprises	Infrastructures and facilities	**Public Sectors**

* Classification of RTDI interventions: Improving governance capacities for innovation and knowledge policies; Innovation friendly environment; Knowledge transfer and technology diffusion enterprises; Innovation poles and clusters; Support to creation and growth of innovative enterprises; Boosting applied research and product development (see appendix).
**Classification of instruments: Infrastructures and facilities; Aid schemes; Education and training.
***Classification of Beneficiaries: Public sectors; Private sectors; Networks
**** Due to the high degree of abstraction that is laid down in the CSF in Objective 1, measuers pursue various objectives/strategies.

Appendix E Case studies

MST.factory dortmund
Description : The project aims at improving the MST business base in Dortmund. **Objective 2** **Policy framework** : Funded by measure 3.3 of the Objective 2 programme, the municipality (city of Dortmund) and the joint federal and regional structural development programme (Gemeinschaftsaufgabe "Verbesserung der regionalen Wirtschaftsstruktur")
Brief history and main features
Policy area: Technology- and Qualification infrastructure **Instruments:** Infrastructures and facilities **Beneficiaries**: Businesses **Was the intervention inspired by a previous experience? Which one?** MST.factory is part of the dortmund-project which is an initiative of the municipality, the business and the academic sector to support the structural change in Dortmund. Municipality, trade unions, university and business teamed up to react on the severe decline of jobs in the 80ies. Nucleus of their activities was the technology centre in Dortmund and the university nearby, which offered some research excellence which should be part of an integrated local development – or cluster - approach. For this reason a sketch of a cluster model for Dortmund was drawn up taking into account the experiences with a similar approach in Wolfsburg. **Which organisations have been involved? What was their role?** A number of organisations were involved to set up the initiative: e.g. municipality of Dortmund, chamber of commerce, NRW Ministry of Labour and Economic Affairs, technology centre Dortmund. Initiators of the dortmund-project were the municipality of Dortmund and the ThyssenKrupp AG. Further partners came from universities, business and administration. **What was the structure of the initiative (operational phases, length…)?** The MST.factory is located at Phoenix West in Dortmund (a formerly industrial site) and is part of a local cluster approach named dortmund-project. It was erected between 2003 and 2005. MST.factory offers infrastructure close to industrial needs for small and medium-sized enterprises and start-up companies in Microsystems technology. The MST.factory offers two main areas of business to SMEs: • business support and qualification • infrastructure services MST.factory can be regarded as technological competence centre which offers companies the necessary infrastructure to develop prototypes. By this the MST.factory supports young companies in their start-up and growth period and hence supports the growth of the micro and nano-technologies cluster in Dortmund. As stated above, the MST.factory is integrated part of the dortmund-project. Five

objectives are central to the dortmund-project approach:

- support to new industries through innovation and research
- modernising existing business structures
- education and research at international level
- creation of 70.000 jobs up to 2010 in the above mentioned sectors
- improvement of the quality of life, conversion of old industrial sites

The following activities were designed to support these aims:

- acquisition of IT companies (meanwhile the largest IT association in NRW named "networker.nrw" is located in Dortmund)
- acquisition of and support to companies active in the field micro-technologies (IVAM an European, national and regional interest association for micro-technologies is based in Dortmund; meanwhile the largest MST cluster in the EU is active in Dortmund)
- e-logistics
- start-up and growth contests for the business sector
- human resources

Crucial milestones and criticalities?
For the whole initiative dortmund-project with its MST.factory one can formulate the following aspects:

- concentration on sectors
- pace and targets: 70.000 jobs until 2010
- promoter and networking
- combination of business and qualification
- institutional autonomy from traditional regional development structure

What is the degree of novelty of the initiative?
This initiative was absolutely new to Dortmund and NRW what structure, objectives and implementation concerns.

Main results

What are the main outcomes (financial and physical)?
10 companies active in micro- and nano-technologies, located at MST.factory. In total 30 companies in Dortmund in this technology field are active with 1.900 employees. Before the start of this approach 10 companies with 900 employees were active in Dortmund.

What are the main evaluation results?
The MST.factory can be regarded as an important milestone for the stabilisation and extension of business active in the field of micro- and nano-technologies. With its activities it supports directly the Dortmund cluster approach, which is implemented by the dortmund-project. By this, it fortifies the technological base in Dortmund and is basis for the creation and the stabilisation of jobs in this technology field as well as for the development of Dortmund. It gained already international recognition. Some start ups at MST.factory have an international background (Russia, Finland, Norway, UK).

Have all the objectives been fulfilled?
As already mentioned, the MST.factory is a relatively "young" initiative which gained momentum during the last years. In general, infrastructural activities or initiatives like

the MST.factory can be seen as a necessary input for the further development of a sector, technology or cluster. It outcomes in financial and physical terms can be evaluated only after a certain period of time. In addition micro- and nano-technologies are at the beginning of various technological value chains and their impact is difficult to assess. However, some objectives are already attained others are pending. What the provision of infrastructure, business support and sales concerns the objectives can be regarded as attained. A more difficult area is the qualification objective, which encompasses the demand-orientated qualification of students.

What is the current state in terms of execution? What are the expected prospects?

The MST.factory exists since spring 2000. Companies were located in the technology park nearby until April 2005, then the tenants moved into the new erected building. A new phase of construction was initiated in May 2006 and will at its end offer further 3.000 qm for the development of prototypes.

Reasons of success and conditions for repeatability

Why has the initiative been considered a good practice?

The good practices elements of MST.factory can be seen in its approach to minimise risks and costs during the start up and growth phase of companies in a high-technology sector. Risks and costs are reduced by the provision of infrastructure and equipment. The latter is bought on company demand by the MST.factory and can be used by the company on a fee basis. This leads to a better financial situation and makes negotiations with capital provider easier and more successful.

In addition, MST.factory can be regarded as good practice due to its integration in a wider local cluster approach. MST.factory stabilises and supports one important pillar for the local cluster development and builds on the existing business and research excellence in Dortmund. Furthermore the broad partnership approach underlines the political ambition to further develop this cluster in a long term perspective.

What are the main socio-economic and institutional conditions that contributed to the success? How?

The broad partnership approach in combination with the cluster activities targeting at stabilising and extending the local technology base are fundamental aspects for the success. The dortmund-project activities were an important pre-condition for the success. Technology expertise assembled in the Technology Park nearby built the technology basis. Finally, the demand-orientated approach was essential get started and to run the MST.factory.

What were the main socio-economic and institutional obstacles?

MST.factory was forced to separate the construction into two construction phases. After the first phase a positive evaluation took place then the second phase started in May 2006.

What are the main lessons?

- A technological base and a broad partnership were pre-conditions for a successful implementation.

- Network approaches are necessary to concentrate players active in the field of technology, politics, qualification, finances.
- MST.factory is one decisive element in a "start up and growth chain", which offers services, consulting, infrastructure and finances from various players.

Did the case inspire new initiatives in either the same or different contexts?
Lower Austria adapted the MST.factory concept. New common initiatives are under discussion with Münster and Twente (The Netherlands).

What are the main aspects of the initiative which are susceptible to be transferred?
Technology activities embedded in a local cluster approach with its broad partnership structure. Pre-conditions are a corporate climate, research excellence and available resources.

Are there constraints to transferability?
Regions without a critical mass of business or research competence won't be able to transfer such approaches. A critical mass of business or research excellence integrated in a cluster approach is a pre-condition for a successful implementation.

Learning regions – Providing support for networks

Title of measure/project:
Lernende Regionen – Förderung von Netzwerken (Learning regions – Providing support for networks)
Description:
With its programme, "Learning Regions – Providing support for networks", the Federal Ministry of Education and Research (BMBF) promotes regional co-operation and networking. The objective is to bring together relevant players from different educational sectors in order to jointly develop new offers for Lifelong Learning within the scope of a regional strategy.
As mentioned above, the initiative learning regions represents a programme of the federal government. In order to not only describe here the funding system and its background, we will also – to some extent – display a concrete project financed under the programme, namely the "Learning region of Leipzig".
Zone: Objective 1 and 3 (ESF)
Policy framework:
Making Lifelong Learning feasible is the common target of the Federal Government. The initiative's policy goal is to create the structural conditions for an open access to the learning worlds of tomorrow.

Brief history and main features

What policy area does the initiative belong to?
Innovation friendly environment.
What are the main instruments characterising the initiative?
Programme Learning Regions
The programme finances the creation and the further development of regional networks which aim at strengthening learning and training actions in a given territory.
Learning region of Leipzig
Leipzig is a region confronted with the social and economic consequences of a sharp

and lasting transition process. As a consequence, we see severe social, economic and ecological changes which represent a challenge for public actions. With education and learning, so the idea of the project, those challenges can best be mastered and turned into competitive regional advantages.

What are the main beneficiaries characterising the initiative?

Training and education providers, users and interfaces, when they network their activities.

Was the intervention inspired by a previous experience? Which one?

Programme Learning Regions

International comparative studies reveal that Germany has not yet been sufficiently successful in developing and using all talents, in particular those of disadvantaged people. The participation rate at vocational training or further training offers is stagnating for almost one decade although constant technological and societal change would require more learning efforts. Thus, it became evident for the Federal Government to build the foundations as early as possible in order to be able to develop competencies and gain qualifications throughout a whole lifetime.

Programmes like the BioRegio initiative and InnoRegio have also influenced the learning regions approach

Learning region of Leipzig

In Leipzig the network was build on a the results of a regional workshop organised in 2001

Which organisations have been involved? What was their role?

Programme Learning Regions

All relevant actors in the training, education and learning sector, from industry and from society can take part in the networks. Currently a good 70 networks are running with an average of 40 – 50 participating partners.

Learning region of Leipzig

The regional network in Leipzig started with five main partners: (1) the university, (2) the association of training institutes in Sachsen, (3) the Chamber of Industry and Commerce, (4) the Regional Forum Leipzig and the (5) regional government (Regierungspräsident) of west Saxony. Today some 140 partners participate in the network – 34 % are enterprises.

What was the structure of the initiative (operational phases, length…)?

Programme Learning Regions

It is a five years programme of the BMBF with an intervention volume of about 181 MEUR. Maximum support period for an individual network is five years. After selection, projects receive a grant letter for one year only. This first year is a kind of planning phase. Funding can be up to 100 % of eligible costs. Then the implementation phase may follow. The second phase is about actually working together and implementing the action plan developed in phase 1. In the second phase networks only receive co-financing from the programme and they must provide own resources to the project budget. The results of an interim evaluation after two years of the implementation phase serve as basis for the decision to degressively continue the support to the network.

Learning region of Leipzig

Leipzig will receive support for 4.5 years until June 2006.

Crucial milestones and criticalities?

The most prominent milestone was the establishment of a broad actors-network in the

Learning region of Leipzig. For this reason some promoters of the network started two years before the project start the lobbying phase and formulated broad action lines. The broad involvement of relevant actors like the university, business, training institutions, chambers and the regional government was key to the success of this project.
Furthermore the definition of action lines by the involved parties – early before the project start – assured the actors involvement and lead to a critical mass of social capital for the further development of the network.

What is the degree of novelty of the initiative?
Traditionally in Germany innovation and research policy from the BMBF was either focussing on a specific research theme or on the firm. Since the mid 1990s a new dimension was added: the region. The BioRegio programme was one of the first programmes in this context. The learning region programme thus continues this regionalised approach. The degree of novelty in this respect is thus limited.

As far as evaluators are concerned, the learning region as a programme can however be taken as an example for the use of Structural Funds (in this case ESF) in the innovation field at national level. At the same time the learning regions programme takes on board the Länder and the regions (below Länder level). The latter as beneficiaries and the first as partners in the decision making process. In particular for Germany this approach represents a high degree of novelty.

Main results

What are the main outcomes (financial and physical)?
Programme Learning Regions
An important result of the programme can be seen in its contribution to the national lifelong learning agenda. Another important result is the experience exchange initiated by the learning regions programme.
Learning region of Leipzig
Through the project a broad spectrum of learning products and learning services could be developed in the region. Furthermore, a certain cooperation culture emerged and the level of trust between the different partners was improved.
What are the main evaluation results?
Programme Learning Regions
From the programme point of view the main result lies in forming national, regional and local development activities by adding "learning activities" to their agenda. By this, a broader definition of "innovation", which encompasses technological and social innovation, was introduced in the participating networks in Germany.

Learning region of Leipzig
New and renewed contacts between business and university. "Learning" is on the agenda for regional development. Furthermore the network was successful in initiating cross-sector activities in the region, which lead to new approaches for innovation. In conclusion, it improved the learning culture in the region of Leipzig decisively.

Have all the objectives been fulfilled?
The programme as well as the specific project in Leipzig are still running. What one can see from the outcome so far is, that most of the goals initially set, were met or are likely to be reached respectively. Germany is now progressing on its pathway to a

lifelong learning strategy thus dealing with one of the weaknesses in the country's innovation performance.

What is the current state in terms of execution? What are the expected prospects?

Some 70 networks were supported in two waves. In June 2006, there is the final deadline for new project proposals within this programme.

Reasons of success and conditions for repeatability

Why has the initiative been considered a best practice?

The learning region initiative has been considered as best practice for Germany as it is the only initiative financed by Structural Funds covering all German Länder. We have pointed out in the report, that there would be need for ERDF actions at this level as well. The learning region exercise shows the feasibility of the approach.

What were the main socio-economic and institutional obstacles?

The federal system in Germany combined with the institutional setting in the research and innovation policy may hinder horizontal programmes covering all Länder. In addition comes that ERDF is being implemented for the most part under the auspices of the Länder.

What are the main lessons?

Structural Funds play only a minor role in the field of innovation and KBE in Germany. With a more coordination orientated approach or with a horizontal programme covering all Länder (or a group of Länder at least) their role could be enhanced. The learning regions programme is a good example for that.

Did the case inspire new initiatives in either the same or different contexts?

Not yet – but it would be desirable.

What are the main aspects of the initiative which are susceptible to be transferred?

The use of Structural funds for a federal initiative which covers all Länder in Germany.

Are there constraints to transferability?

This is a good practice from Germany for Germany.

Appendix F Further reading

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List of useful websites at national or regional level

- www.bioz-dresden.de,
- www.bio-city-leipzig.de
- http://www.sachsen.de/de/wu/smwa/wirtschaft/europa/strukturfonds/efre/beispiele/
- http://www.biosaxony.de.
- www.kompetenznetze.de
- http://www.lernende-regionen.info/dlr/2_7_10.php
- http://www.bmbf.de/
- http://www.bmwi.de/
- http://www.innovationen-fuer-deutschland.de/
- http://www.unternehmen-region.de

Appendix G Stakeholders consulted

List of all individuals interviewed

Name	Position	Organisation
Dr. Heiko Kopf	Managing Director	MST.factory
Prof. Dr. Knoll	Professorship	University of Leipzig
Mr. Eric Dufeil	Head of Unit	DG Regio
Mr. Martin Hennicke	Head of Unit	Ministry of EconomicAffairs, Düsseldorf (MWME)

Participants to focus group

Name	Position	Organisation
Birgit Godehardt	Managing Director	Regional Agency, OWL Marketing GmbH
Martin Hennicke	Head of Unit – Objective 2 intervention	MWME NRW
Hildegard Mai	Head of Unit EU-Affairs	Wirtschaftsförderung Dortmund
Ralf Meyer	Project Manager	AGIT GmbH
Wulf Noll	Head of Unit – Regional Innovation Policy	MWME NRW
Werner Pfeifenroth	Projectmanager „Zukunftswettbewerb“	ZENIT GmbH
Dieter Rehfeld	Head of Department for Innovation	IAT
Dr. Gerd Weyers	Director	NRW Bank