REPORT ON STATE OF THE ART IN UNIVERSITY-INDUSTRY COOPERATION AT REGIONAL LEVEL: SYNTHESIS DOCUMENT

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Executive Summary

This report analyzes the current situation of university-industry cooperation in eight European regions: Moravia-Silesia (Czech Republic), Norte (Portugal), Valencia (Spain), Saxony (Germany), Emilia Romagna (Italy), Lower Austria (Austria), West Finland Alliance (Finland) and London (UK). To carry out this analyse three aspects are assessed for each region: (i) the socio-economic features of each region which influence the intensity and the way that firms and universities can co-operate; (ii) the interactions and relations among the actors within each region; and (iii) the mechanisms for promoting and managing co-operation including the legal-political framework to support and enhance co-operation.

The most relevant features concerning innovation and the role that universities play in enhancing innovation in the regions participants in the project are as follows:

Moravia-Silesia Region (Moravskoslezko, Czech Republic)

As far as the perception about how innovative process is being developed in Moravia-Silesia Region a number of basic points can be stated:

- The success of innovations comes out from the quality of the founders' ideas and their elaboration through an intuitive "trial and error process" rather than from systematic searching for opportunities;
- Most innovative ideas are based on the professional knowledge of entrepreneurs, i.e. on their knowledge about what the market needs, and not the needs expressed by customers;

- Most innovations are technologically -rather than commercially, oriented. Employers tend to consider innovation only the developments resulting from R&D or technology transfer activities;
- Employers generally complain about difficulties of accessing to capital sources as an obstacle which hinders them from developing their business activities. Often the only source of capital is bank loan, which requires guarantees.

Regarding the current situation of innovative business and the relationship between universities and industries there is a perception that there are good opportunities for entrepreneurs willing to accept the risks related to their business ideas, and capable of producing commercially viable innovations. The success of the regional innovation strategy (RIS) will be determined by the extent to which the region can succeed in providing the environment necessary to achieve that innovation ideas become real entrepreneurial projects. It is necessary to ensure that support is given to viable and commercially useful ideas. But the building of a world-class competitive environment to exploit entrepreneurial opportunities based on the new technologies will be difficult as the necessary collaboration of R&D institutions to achieve this aim cannot be granted since they are not involved in the entrepreneurial competitive environment.

Norte (Portugal)

University-industry cooperation in the Northern Region of Portugal is favourably evolving. In the last decade there has been consistent growth fostered by both competence and mutual trust between the two main universities, Porto and Minho - and their affiliated institutes, and the local industry. In recent years, both universities

have been paying increasing attention to local socio-economic activity and a non-elected regional government structure -the Northern Region Coordination and Development Commission (CCDR-N), has provided support to this trend. At the same time, other local government structures, entrepreneurial associations and a new generation of well-qualified and well-trained entrepreneurs and managers, now occupying key positions in industry, have also crucially contributed to the success of this cooperation. It is clear that university-industry cooperation would benefit from more direct interaction and less intervention from intermediate structures and entities. However, this would require the upgrading of qualifications and skills of firms' personnel. Some positive trends in this direction can be observed but a significant work remains to be done.

Region of Valencia (Comunitat Valenciana, Spain)

From a quantitative point of view, university-industry relationships are becoming increasingly relevant, although from a qualitative perspective high added value interactions are not predominant. Most actions concern technology advising and consultancy rather than development of R&D activities, patent licensing or starting up of new firms. Valencian universities have made considerable efforts to strengthen the so called "third mission" implementing actions as the introduction of interface structures and other instruments to promote university-industry collaboration (e.g. Technology Transfer Offices - TTOs or Science Parks) .

The contribution of universities to the learning process, acquisition of competences and access of graduates to the labour market is based on the offer of both formal and non-formal training, mainly in the areas of natural sciences and engineering.

All universities are carrying out programmes to facilitate the access of their graduates to the labour market.

The public R&D system in the Region of Valencia includes five universities and a number of public institutions belonging to national or regional government. Most relevant of them are research institutes set up by the Spanish National Research Council (CSIC) and a network of industry-oriented institutes supported by the regional administration.

The business structure is mainly based on a dense fabric of small and medium-sized enterprises (SMEs) and microfirms. A large majority of activities in the Region of Valencia are labour-intensive sectors and only a few companies -also SMEs, specialize in high technology and knowledge-intensive activities.

Regarding policy instruments to enhance university-industry cooperation, a number of instruments designed at a European level co-exist with others implemented by national and regional authorities, but broadly speaking, results are still modest.

Saxony (Sachsen, Germany)

The backbone of university-industry cooperation structure in Saxony is made up, on the one side, by universities and research facilities and, on the other side, by the regional industry -represented by enterprises, industrial associations (chambers of industry and commerce, chambers of handicrafts, entrepreneur's associations). Technology Transfer Offices promote collaboration between them. Federal and Land authorities -particularly ministries, have an influence on university-industry cooperation through the issuing of laws, programmes, and promotion activities.

The aim of the innovation policies implemented by the Land of Saxony is to promote R&D and to provide support for the application of new technologies in the

industry. Further from the process of developing new technology and enhancing its transfer and diffusion, the innovation environment in Saxony has notably evolved in recent years to include production organization, education and training and venture capital provision. At present it is closely interwoven with both social matters (e.g. traffic, health or environment) and business matters (technical and organizational innovations).

The action by the Federal government, on its side, is aimed at three main targets: the strengthening of industrial research capabilities, the networking between industry and science, and the support to innovative enterprises and to business start-ups by facilitating the access to capital markets.

Thus, university-industry cooperation is at the centre of innovation policy as exemplified by the number of existent programmes.

Emilia-Romagna (Italy)

University-industry cooperation in Emilia Romagna (Italy) is oriented to match the needs of the industrial districts in the region, which for decades have shaped the regional economy and the regional network of academic competencies. Specialization in universities and research centres has often facilitated production activities. This is reflected in the location of scientific excellence across the regional territory. With only a few exceptions, all the more recently established academic institutions -those set up after the 1970s, are located in areas with high concentration of businesses: Parma concentrates faculties and R&D institutes dealing with food safety, and the provinces of Reggio and Modena concentrate competencies in mechanics. The relatively small size of provinces and a strong cohesion among actors in the “district system”, have allowed university-industry cooperation to progress with a limited intervention of regional

authorities, mainly focused on the definition of funding and cooperation schemes according to common regional objectives of economic growth. The role of industrial associations has been essentially acting as “translators” of the needs of the productive environment to the political level, what has allowed the regional governing bodies to respond to most of the needs of industry. The ability of universities and research centres to interact with industry has been fairly well exploited and has led in some cases to consolidate centres of excellence in the international arena, e.g. Parma for food safety. However the ability of universities to respond to the needs of local production areas is hampered by the constraints of the administrative system in Italy and the obstacles hindering the Italian research system from responding rapidly to the evolution of businesses.

SMEs have benefited from a favourable environment resulting from the integration of sector-oriented innovative competencies within densely populated commercial areas, as well as from the capacity of the system to deal with innovation needs making use of local resources. In particular, Emilia-Romagna is characterized by its strong entrepreneurship -mainly in family-based SMEs, its non-perfect industrial districts, and its strong co-operative systems. The economy of Emilia-Romagna is based on agro-industry -evenly diffused across the area, mechanics and automation -mainly located in Imola and Faenza, chemicals -located in Ravenna, and ceramics and other materials. Services play an important role -mainly tourism and leisure in Rimini, logistics -benefiting from the strategic position of Emilia-Romagna in central-eastern Italy, and, more recently, some information and communication technology and environmental services; but innovative spin-off processes in Italy are still very complex. Identification of innovation priorities at regional level has produced instruments - innovation funding schemes, likely to match the needs of the industry. However

national instruments (e.g. PNR, Piano Nazionale della Ricerca) often duplicate regional schemes -at least in the case of Emilia Romagna, and have rather limited impact.

Lower Austria (Niederösterreich, Austria)

The strategy for economic growth in Lower Austria is aimed to provide powerful stimuli for dynamic and sustainable development to assert Lower Austria as an attractive economic location in Europe. The main focuses of its economic policy are providing support for a significant qualitative development and reinforcing measures to enhance investment by regional businesses. Main policy areas involved in this strategy are:

- Innovation and R&D as a way to provide a base for industrial applications to obtain new or improved products, services or production processes throughout the economy;
- Technology and technology transfer favouring the setting up and expansion of centres of technological competence and TTOs;
- Enhancing of business re-shaping and development of new start-ups to create new skilled jobs and increase the added value of Lower Austria's economy;
- Internationalization -mainly by the re-opening of foreign markets which had been closed until recently, as a way to reinforce an international profile for Lower Austria;
- The strengthening of collaboration among SMEs and between SMEs and research institutions in R&D. Competing capabilities of companies in Lower Austria suffer from small firm's size and limited resources. Improving their

international competitiveness by means of innovation requires external resources, which can be partly obtained from cooperation and networking.

An active technology policy in Lower Austria is working in promoting technology and reinforcing the international competitiveness to gain a position for Lower Austria as a modern technology business centre in Europe. A number of innovative, industry-focussed projects are currently under development, the most relevant of which is the setting up of centres of expertise and the promotion of clusters of new businesses. Research areas involved in this policy include microsystems technology and nanotechnologies; biomedicine; electro-chemistry; environmental technologies; agricultural and environmental biotechnology; automotive technologies; bioenergy; ICT; building technologies; rapid prototyping (RPT); and powder injection moulding (PIM). Centres of expertise combine both basic-scientific research and applied research. In this way they offer an optimal infrastructure to facilitate heightened cooperation between industrial entrepreneurs and scientific-research partners.

West Finland Alliance (Länsi-Suomen Allianssi, Finland)

The West Finland Alliance (WFA) area is divided into different regions according to their respective development needs. West Finland Alliance, included in Objective 2 Programme, has as a number of strategic priorities:

- Enhance employability of human resources,
- Promotion of the information society,
- Increase interaction between cities, towns and rural areas,
- Preservation of local culture

- Promote internationalization, equality and sustainable development.

West Finland Alliance provides services to SMEs and new start ups in the area. A number of Technology centres have been created to promote and enhance SMEs operations, although they have also attracted the attention of large companies. There are multiple subregional organizations designed to promote new SMEs and help to their development by providing incubator facilities and free consulting services. Financial aid can be provided from different sources and purposes: exportation, firm-development, product-development, training on marketing, management or leadership, etc. On the opposite there are no programmes to funding basic research by companies. In this way, aid for operational conditions always involves universities and SMEs and is provided for research into areas matching business community needs and having commercial prospects.

The West Finland Alliance area has a number of vocational training centres and adult education centres linked to universities. These centres increase the social impact and the interaction of universities with society.

Innovations in Finland frequently come out into existing companies and are often based on customer's needs or ideas. Universities and research institutions are also a source of innovations. Traditionally, Tampere region -especially Tampere University of Technology, is considered to be a pioneer in university-industry cooperation, which has had a fast development since the first experiences in the 1970s as a way to face up a major technological and economic crisis. The education and research system underwent an intense re-shaping and, since then, university-industry cooperation has being increasing rapidly. But if the competitiveness of Finnish companies is to be secured for the future, the cooperation must continue, expand and deepen. New research and new innovations are crucial since technologies are quickly copied, imitated or matched with

new advances around the world, and innovations are frequently the result of good cooperation. In any case University-industry cooperation -as any other type of cooperation, relies on people making personal trust and human relationships a key point for success. Thus it is important that contact persons in universities and companies are carefully selected in order to achieve profitable cooperation. The level of cooperation in different areas into West Finland Alliance varies but it emerges that distance to universities has a significant negative effect.

London (United Kingdom)

London is currently experiencing a long period of extraordinary growth, both in terms of its economy and its population. During the 1980s a major reduction in the size of London's manufacturing sector took place. Unemployment was high and the region was losing population. Now, London's economy is expected to grow by 3.5% a year until the end of the decade, helped by the demand for financial and business services. London's economy and job growth is outpacing that of the rest of the UK. London's population is currently about 7.5 million and is growing by over 1% per year. It is anticipated that there will be 750,000 more people living in London by 2015 – the equivalent of a major English city such as Leeds.

Financial and business services provide 1.4 million jobs in London which is about a third of the total. Business service jobs are increasing at the rate of about 3% a year.

Despite these developments, particularly the growth in employment and the accommodation of large numbers of immigrants, London still has areas of persistent social deprivation and unemployment which are a challenge for policy makers. The problems particularly affect black and minority ethnic groups.

There are 42 institutions of higher education in London creating a diverse pattern of university-industry collaboration. A number of the very large universities probably see themselves as addressing a global market in terms of attracting students and staff, and in exploiting their research outputs. Other universities, including London South Bank are much more embedded in the region, drawing student numbers from a more local area and engaging with London employers in offering degree courses to meet their needs in the context of a growing economy. For this group of universities cooperation with industry will more likely mean region-based businesses and other organisations. In general, finance and the quantum of activity are heavily weighted to the larger universities.

There is considerable competition between London's universities to attract revenue from business. It is reported that there is currently an upward trend in the aggregate level of turnover involved with consultancy providing the largest income, followed by professional development training programmes. There is less success in generating income from exploiting intellectual property and commercial spin-outs from research activity.

Concluding remarks

The different regional cases analysed in the report provide a wide range of situations to assess the state of the art of university-industry co-operation. Industry structure in the region emerges as a key factor conditioning the possibilities for university-industry co-operation and the way it can be implemented. Basically

universities have a primary task, which is to provide qualified human resources to develop knowledge-demanding functions in the society. A second task -although tightly connected with the former, would be to provide new knowledge by means of R&D activities.

The introduction of the so called "third mission" of universities -that is to help innovation in industry by co-operating with firms and entrepreneurs, has to face up important difficulties when the economic structure of a region is not particularly demanding of scientific-qualified human resources and it is not in good condition to make use of brand new technological knowledge based on scientific progress.

Technology demands by companies in these regions tend to concentrate in medium-qualified human resources -a higher university degree and R&D experience may be not specially required, and on technology transfer actions which could be provided by consultancy firms -if the market for advanced services in these regions were suitably developed. In these situations the "third mission" of universities involves a certain level of contradiction with the "classical" missions of universities and the structure of incentives for university researchers. Whilst "classical" missions of universities push them to offer education at world class level and scientific research on the frontier line of the existing knowledge, companies in the region are not able to take advantage of this offer. Brain drainage, over-qualification of university graduates for available jobs, non-exploited patents or licensing to companies outside the region may be the undesired effects of a "well done" job by universities concerning their "classical" missions in regions without technology background in their productive systems.

In this way combining the vocation of universities to provide world class level education and leading research and make them immediately profitable for companies in the area -as may be the case in a technology advanced industry context, becomes much

more complex in the cases where such a context has not still been developed. Universities and local authorities in this regions are confronted to the task of allowing universities to pursue their objectives of excellence in education and research whilst, at the same time, guarantee that the activities done by universities benefit the local economy.

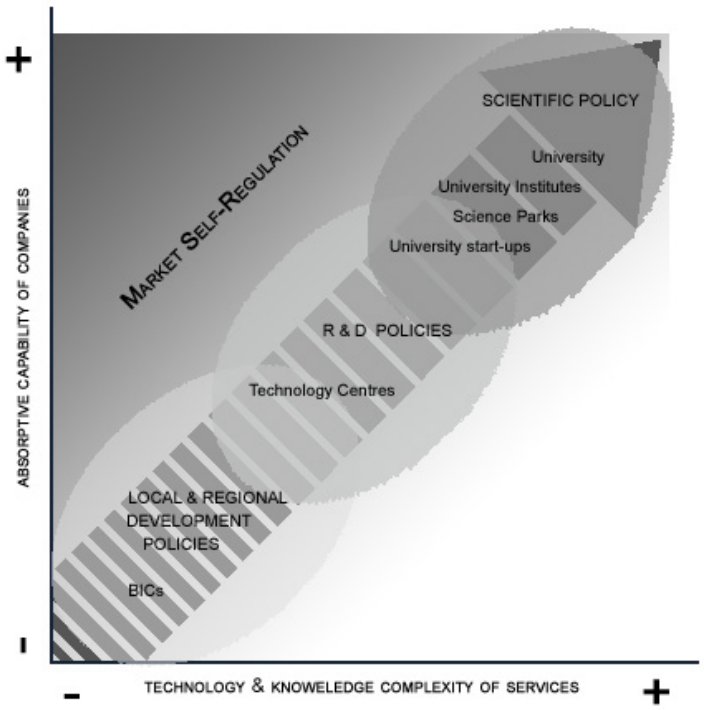
The setting up of technology centres is a widespread practice to implement co-operation between universities and industry. As it is also -in a minor extent, the setting up of incubators for technology-based companies as a way to enhance the emergence of a business sector more technology-oriented and more demanding for R&D and highly skilled human resources. This objective, however, may be hindered by the lack of complementary measures -e.g. seed capital and venture capital, and the lack of a suitable environment for the new start-ups to do business (providers, customers, rival companies with whom they could compete and co-operate).

A diversity of strategies can be found for the setting up of technology centres. In some cases they are the result of initiatives from the universities, whilst in other cases they come out of joint initiatives between businesses -companies or industry associations, and governments. Action by governments may be specially important in regions with a less technology-oriented industrial fabric. In these cases universities can find difficult to balance their classical roles with an active and enriching interaction in two directions with the business sector.

A specialization of functions between universities, university research institutions and industry technology centres may be necessary. The scientific complexity of services to be provided, the absorptive capability of technological knowledge by the business sector, and the role that a self-organised market for knowledge intensive services is able to play in the region are key points to implement an efficient policy (Figure 1). A regional strategy to set up global objectives for regional

development and co-ordinate the different policies and actors involved in achieving them seems to be necessary to assert that all policy instruments are doing their job and pushing together in the right direction both providing increasingly more knowledge intensive services and simultaneously working in increasing absorptive capability by the business fabric.

Figure 1. University - Industry co-operation & Regional Development Policies



Competition among policy instruments to co-operate with companies as a way of getting income coming from the companies themselves or from public funds issued to enhance co-operation, could easily divert universities or technology centres from their objectives by impelling them to provide rather low complex services which could be provided by the market. Policies for enhancing regional development by providing knowledge services are operating in a rather thin area and in a dynamic context. That

means that as far as the process of development goes ahead, a private market for increasingly complex technology and knowledge services should also be developed. In this way policy instruments put forward to enhance co-operation with potentially user companies should be moving progressively to provide further more complex services. Competition to increase co-operation with companies –and get income from them or from public programmes implemented for that purpose, could easily induce negative effects by diverting policy instruments –universities or technology centres, from their upgrading mission and taking them to interfere with a private offer for technology and knowledge services already existent or under development.

The cases analysed in the report provide a diversity of situations: In Moravia-Silesia university and businesses seem to be still in different worlds without an active strategy and instruments to facilitate contact. Norte (Portugal), Valencia, and Emilia-Romagna have succeeded in implementing networks of technology centres to favour the diffusion of technology advances to traditional non-technology based industries. In the case of Emilia-Romagna the existence of an important equipment sector has played an key role as demander of R&D and technical services from universities and in asserting the technology transfer processes from universities to the whole business community. The cases of Saxony, Lower Austria and West Finland Alliance are examples of areas with an important scientific and technological background that are concentrating efforts in catching up with the entrepreneurial exploitation of last wave technologies (micro-electronics, biotechnology, nanotechnology, telecommunications, etc.), a majority of which have been developed or are being commercially exploited by non-European companies. The scale and complexity of the London regional economy makes it difficult to encapsulate the nature of university-industry

collaboration simply. Although there has been a big reduction in the contribution of manufacturing, with the service sector more than filling the gap, there is considerable scope for industry-university working with the manufacturing sector which remains, a growing media and creative industries sector, the health care sector, leisure and tourism and the business and financial services sector itself. There are also significant university links with global businesses, particularly in the high tech area.

STATE OF THE ART IN UNIVERSITY-INDUSTRY COOPERATION AT REGIONAL LEVEL. RUISNET REPORT
Synthesis Table

INDEX		Indicators	Moravia-Silesia (Czech Rep.)	Norte (Portugal)	Valencia (Spain)	Saxony (Germany)	Emilia Romagna (Italy)	Lower Austria (Austria)	West Finland Alliance (Finland)	London (UK)
SOCIOECONOMIC STRUCTURE		Surface (Km2)	5,535	21,278	23,260	18,413	22,125	19,174	64,647	1,584
		Population (thousands)	1,253	3,700	4,500	5,500	4,100	1,600	1,300	7,400
		Active population (% total population)	68.3	52	58.6	n.a.	67.4	67	n.a.	74.6
		GDP per capita (euros)	6,189	10,374	17,517	19,259	28,729	22,388	24,635	40,402
		Internal R&D exp. (% GDP)	0.7	0.67	0.87	n.a.	1.28	1.5	n.a.	0.96
		R&D exp. executed by firms (% GDP)	0.56	0.23	0.3	n.a.	0.77	n.a.	n.a.	0.38
		R&D exp. executed by Government (% GDP)	0.05	0.03	0.1	n.a.	n.a.	n.a.	n.a.	0.12
		R&D exp. executed by universities (% PIB)	0.09	0.41	0.47	n.a.	n.a.	n.a.	n.a.	0.45
UNIVERSITY-INDUSTRY COOPERATION CHARACTERISTICS	Actors	Nº of universities	4	5	5	5	7	1	4	21
		Nº of research centres	5	n.a.	16	24	20		n.a.	7
		Nº of Innovation and Technology Centres	2	4	14	33	30	3	7	9
		Nº of firms	223,000	207,571	348,692	145,561	400,000	149,380	62,000	300,000
		% of SMEs	n.a.	99.5	99.8	99.7				75
		Productive specialization according to technology intensity	Medium-low	Low	Low	Medium-High and High	Medium-High	Medium-High	Medium-High and High	Medium-High and HIgh
	Training of human resources and labour market	Total number of HE centres	4	9	7	10	7	6	13	42
		Nº of students	35,000	60,000	142,000				90,000	290,000
		Nº of teachers	n.a.	10,000	10,000	11,470	6,400			24,000
		Level of development of the longlife education	Medium	Medium	Medium	Medium	Medium	High	High	High
		University programmes to foster employment of new graduates	n.a	n.a.	Yes	n.a.	n.a.	n.a.	Yes	Yes

	University-Industry Cooperation	Existence of university interface estructures	n.a.	Yes	Yes	n.a.	n.a.	n.a.	Yes	Yes
		Nº of scientific parks	1	0	4	n.a.	n.a.	1	Several	0
		Intensity of University-Industry relations	Low	Medium	High	Low	High	Low	Medium	High
		Main university-industry cooperation instrument	Technical support	Technological support	Technological support and R&D contracts	n.a.	Cooperative R&D	n.a.	Firm projects (students) and master thesis	R&D contracts and consultory
	Entrepreneur-ship	Intensity of technology based entrepreneurship	n.a.	Low	Low	Low	n.a.	High	High	Medium
		Existence of university programmes to foster entrepreneurship	n.a.	Yes	Yes	n.a.	n.a.	n.a.	n.a.	Yes
		Nº of firm incubators	1	0	4	n.a	n.a.	10	Several	n.a.
INNOVATION POLICIES		Main decision framework for innovation policies	National	National	Regional	National	Regional	Regional	Regional	National
		Orientation of the formulation of innovation policies	Supply	Supply	Supply	Demand	Demand	Demand	Demand	Supply

1. Introduction

The aim of this report is to analyse the current state of the art of university-industry cooperation in eight European regions: Moravia-Silesia (Czech Republic), Norte (Portugal), Valencia (Spain), Saxony (Germany), Emilia-Romagna (Italy), Niederösterreich (Austria), West Finland Alliance (Finland), and London (UK). Three basic aspects in each region are analysed: Socio-economic and geographic features; (ii) Interactions and relationships among business, research and government actors in each region; and (iii) Mechanisms for the enhancing and managing of university-industry co-operation.

2. Socioeconomic structure of the regions

This section provides an overview of the main social, political and economic features of each region to enable better understanding of university-industry cooperation characteristics and possibilities in each case.

Population, activity rates and labour market

Main figures concerning geographic, population and labour market of the analysed regions are shown in Table 1.

Moravia–Silesia is located in the north-eastern part of the Czech Republic. It has an area of 5,535 sq km and it is the most populated region in the Czech Republic with 1,253,257 inhabitants (around 12.2% of total Czech population) with a population density of 230.9 per sq km. In 2003, active population rate was 68.3% of total population. 57.7% of total population had an employment and 14.8% of active population were unemployed.

The Northern (**Norte**) Region of Portugal covers an area of 21,278 sq km (23.1% of Portugal's total area), with 3.7 million inhabitants and a population density of 174.8 inhabitants per sq km. In 2003, Labour force participation rate was 52.0% of total population. Employment rate was 48.5% out of total population, and unemployment was around 7.7% of active population.

The **Region of Valencia** is located on the eastern coast of Spain. It has an area of 23,260 sq km. and just over 4.5 million inhabitants (10.5% of the Spain's population), with a population density of 195 inhabitants per sq km. In 2003, labour force participation rate was 58.6% and employment rate as a percentage of total

population was 52.1%, both percentages were two points above the national average. The rate of unemployment was 11.1%, slightly higher than the rate for Spain.

Saxony, with an area of 18,413.3 sq km and a population of 5.5 million, is the tenth-largest of all sixteen federal estates in Germany but ranks sixth in terms of population. Saxony, whose capital is Dresden, is divided into three principal boroughs which are subdivided into 22 districts. In 2003, employment rate was 62.0% of total population.

Emilia Romagna is one of the largest Italian regions. It covers an area of around 22,125 sq km. Its population amounts about 4.1 million inhabitants (around 7.1% of the Italian population). Population density is 181.0 per sq km. In 2003, the labour force participation rate was 67.4% of total population. 65.5% of population had an employment. Unemployment rate (3.4% of active population) was the lowest in all regions analysed in this report.

Lower Austria is the largest of all nine federal states in Austria and ranks second (after Vienna) in population. Over 1.5 million people live in Lower Austria (around 19.2% of the country's population) giving a relatively low population density (81.6 inhabitants per sq km) compared to the other regions analysed in this report. In 2003, labour force participation rate was 67.0% of total population, employment rate was 60.9%, and 10.0% of active population were unemployed, close to the Austrian average.

The Regional Council of Central Finland (Ostrobothnia, Satakunta, South Ostrobothnia) and the Council of Tampere Region make up a strategic coalition known as the **West Finland Alliance** (WFA). WFA, with 64,647.1 sq km is the largest of all regions participating in Ruisnet project, but only 1.3 million inhabitants live in the area (25.4% of the Finnish population) giving as a result a population density about 21.0 persons per sq kilometre. Employment rate in 2003 was 66.0% of total population and unemployment rate was 9.4% of active population.

London has a total land area of 1,583.7 sq km and a population of 7.4 million inhabitants (around 12.4% of the UK as a whole). Its population density is 4,654.4 persons per sq km (almost 20 times higher than the average population density for the UK). Hence, London offers a high concentration of population and a milieu that fosters all kinds of interactions and opportunities for collaboration. In 2003 activity rate as a percentage of working-age population was 74.6%, which is below the UK average, but unemployment rate (7.0% of active population) was considerably higher than the UK average of 4.8%.

Table 1. Main population and labour market figures, 2003.

Region	Surface (Km^2)	Population (million)	Density (inhab./ Km^2)	Labour force participation rate	Employment rate	Unemployment Rate
Moravskoslezko – MSR	5,535.4	1.3	230.9	68.3	57.7	14.8
Norte	21,278.0	3.7	174.8	52.0	48.5	7.7
Valencia	23,260.0	4.5	195.0	58.6	52.1	11.1
Saxony	18,413.3	5.5	290.7	n.a	62.0	n.a
Emilia Romagna	22,125.0	4.1	181.0	67.4	65.5	3.4
Lower Austria	19,173.8	1.6	81.6	67.0	60.9	10.0
Western Finland	64,647.1	1.3	21.0	n.a	66.0	9.4
London	1,583.7	7.4	4,654.4	74.6	67.2	7.0

Source: Own elaboration from the information provided by regions.

Economic and innovation indicators

Table 2 presents some macro indicators for the regions participating in the project: Gross domestic product (GDP), GDP per capita, Regional National Summary Innovation Index (RNSII), and Regional Revealed Summary Innovation Index (RRSII) based on the European Innovation Scoreboard (EIS). As shown in the table there are wide differences in total GDP and GDP per capita. London ranks first in both, followed by Emilia Romagna. It can be seen that there is a positive relationship between a country's aggregate wealth and its innovation performance, ranking London and Emilia Romagna also in the highest positions in terms of RNSII and RRSII.

Table 2. Macro economic and innovation indicators

Region	GDP (million €)	GDP per capita (€)	RNSII	RRSII
Moravskoslezko – MSR	8,728.6	6,188.8	n.a	n.a
Norte	38,403.7	10,374.2	80.0	53.9
Valencia	76,055.3	17,516.8	92.0	70.7
Saxony	83,476.2	19,258.5	87.0	92.5
Emilia Romagna	116,504.6	28,728.6	124.0	101.4
Lower Austria	34,761.4	22,388.1	79.0	73.9
Western Finland	32,602.2	24,635.0	66.0	84.7
London	298,656.8	40,401.5	102.0	113.5

Source: Own elaboration from the information provided by regions.

Productive structure and sector specialization

Economy in all regions in the study has been moving consistently towards service activities in terms of Gross Value Added (GVA). Main economic characteristics of each region's are as follows (see also Table 3):

Moravia-Silesia represents a significant share in total Czech industrial production ranking second among all Czech's regions in terms of industrial sales.

Automobile industry, glass, pottery and building materials have been increasing employment, whereas textiles have significantly decreased as well as metal industries as a result of reduction in steel working activities.

In 2002, three industrial clusters were organized based on strong industrial groups in the region: engineering, wood-processing and IT. Additional clusters are being implemented in automobile subcontracting and hydrogen technologies.

In the **Northern Region of Portugal** main industries are textiles, footwear, wood, furniture and cork. Technology-intensive companies are growing rapidly, but traditional sectors are still clearly predominant. The economic activity in the region can be summoned up in seven clusters: shipbuilding and ship repairing; textiles, wearing apparel and footwear; wood and cork products; automotive components (plastics and metal); electronic products; medical devices and pharmaceuticals; and food products (milk, wine, beer, etc…).

In the **Region of Valencia,** the primary sector is relatively small and basically consists of agricultural exports, especially citrus fruits. The energy sector mainly consists of the production of electricity from thermo-nuclear, fuel oil and, to a lesser extent, hydraulic sources. Manufacturing activities include a number of traditional low-medium technology sectors such as ceramic tiles, furniture, footwear, textiles, toys, etc. Small and medium-sized enterprises and export orientation are a characteristic of these sectors, as it is their location in industrial districts. Building and public works have grown considerably over the last 20 years as a result of demand for more housing and public and tourism infrastructures. Finally, the tertiary sector includes a number of

different sub-sectors with a long tradition in the region, transportation and trade being the most relevant.

In terms of employment, in 2004, the primary sector accounted for 4.2% of total employment, construction 13.4%, industry and energy 21.3%, and the service sector for approximately 61.1% of employment.

Saxony has a long tradition as one of the "cradles" of industrialization in Germany in the 19th century and continued to be an important industrial centre during the socialist era. The change to a market economy which was brought about by German reunification in 1990, initially led to the widespread collapse of the existing economic structures. Companies massively failed, which resulted in widespread unemployment. Business had to undergo a process of fundamental structural transformation. However, reunification also brought economic opportunities and Saxony is quite successful compared with other regions in eastern Germany.

Saxony economic structure consists of: agriculture, forestry and fishing - 1.5% share of GDP; industry (except building) - 21.5%; construction - 7.5%; commerce, transportation and catering - 18.4%: finance, rental and business services - 26.1% and services 25.1% of GDP. The employment structure is 28.8% industry (including energy, water supply, mining, production and construction) and 68.7% in services.

The main industries are automotive assembly, food processing, metals extraction and processing, machinery and electronics. Housing and building underwent remarkable growth in the years following reunification. In 1996, its contribution to the total value added of Saxony was 18.0%, three times higher than in the western German states. Since 1997 growth of building activity has slowed whilst, on the opposite, tourism has been consistently gaining relevance to the economy of Saxony.

Emilia Romagna, along the second half of the 20th century, shifted from a mainly agriculture based economy to a service oriented one. A key point for this transformation has been the ability by the region's authorities to understand the needs and provide support to small business for their technological development and access to new markets. Industrial production in the area is organized in a number of highly-specialized productive districts. The main actors are SMEs which, employing individually less than 50 people, make up more than 90.0% of businesses in the region (more than 400,000) and employ 64.0% of the total workforce. Among SMEs, there is a dense network of over 150,000 small and very small artisan-type companies that make up more than 10.0% of Italy's total. Manufacturing activities are in first place among this artisan sector with 50.0% of the workforce, followed by the service sector (more than 25.0%) and building and masonry (a little over 20.0%). The artisan sector contributes approximately 12.0% of regional income and 25.0% of the added value of industry in Emilia Romagna. Having developed in tandem with the evolution of local productive systems, the artisan sector is embedded in a dense network of sub-contracting companies. Subcontracting sector in Emilia Romagna is one of the most important in all Italian regions and it is vertically integrated with the activities of larger businesses. The quality of sub-supply networks, especially in mechanics is an asset for that many foreign and multinational companies were transferring operations to manufacturing districts in Emilia-Romagna. In this way, the regional industry system is becoming increasingly diversified, but having an important backbone on metal and mechanical industries, which account for 45.0% of the workforce.

Seven large technology and manufacturing areas are specially relevant: agro-food industries; machinery; building and construction; mechanical-engineering;

fashion; furniture; health industries (biomedicals, orthopaedics, pharmaceuticals, cosmetics and medical equipment).

Lower Austria has a strong industrial tradition. Manufacturing activities account for 36.0% of GDP, above Austria's national average. Most important industries are: machinery and steel industry, electrical engineering, stone working, ceramics, chemicals, metal products, food industry and luxury consumer goods industries. As a result of increased EU demand Lower Austria's industry has been able to achieve considerable gains in production.

Breakdown of Lower Austria's GDP for economic sectors is as follows: primary sector: 7.8%; secondary sector: 33.5%; tertiary sector: 58.6%. In 2001, Lower Austria represented 15.3% of Austria's GDP.

Employment structure in 2000 was 8.0% in agriculture, 28.9% in industry - above Austria's share, and 63.2% in services -4.0 points lower than the national average. Manufacturing activities accounted for 67.0% of total jobs in industry. Regarding the tertiary sector, wholesale and retail trade, and repairing of motor vehicles and personal and household goods accounted for 32.0% of employment, the highest share among all federal states in Austria.

The **West Finland Alliance** (WFA) area has undergone substantial structural change from traditional industry to information technology (IT), and from agriculture to services. The value of industrial production in the area is almost a third of value of national industrial production. Even though the WFA area has undergone substantial structural change, most people are dependent for their livelihoods on traditional industry, trade and services. Businesses in the area range from multinational

corporations (MNCs), some of which are market leaders in their fields, to SMEs-making their own products or acting as subcontractors, and micro enterprises, with less than five employees, operating mostly in the service sector.

Major enterprises in the WFA area are ICT companies, machinery producers, electric motor manufacturers, marine engine manufacturers, mining equipment factories, tyre manufacturers, eye medication companies, windshield machine makers, press felts and dryer fabric manufacturers for paper machinery, forestry harvester manufacturers, and biotech and energy companies.

The structural change in the 1990s left a high level of structural unemployment, which stills prevails, but in the coming years it is expected that there will be a lack of skilled labour in many fields as a result of the ageing of the population. In the WFA, successful areas have formed clusters usually involving 1-3 large multinational or global companies. Local SMEs are connected to the growth as subcontractors.

The dependence of the **London** economy on the financial and business services sector has already been explained. Although it is performing strongly now, the dependence on this sector could be regarded as an area of vulnerability for London. Primary and manufacturing industry now only accounts for 8.5% of gross value added and 6% of the jobs in the region. However, the point is frequently made that in a post industrial economy it may be that definitions of manufacturing should be drawn more widely.

Significantly for the London region, despite it being the centre of government, the public sector makes up only about 35% of the total economy with the contribution of the commercial sector being commensurately large. This contrasts with some regions

of the UK where the public sector exceeds 60% of the economy. This suggests that the potential for university-business collaboration in London is considerable providing the appropriate links can be established.

Table 3. Distribution of the technology sectors according to industrial GVA.

Region	Low Technology	Medium-Low Technology	Medium-High Technology	High Technology
MSR		Heavy industry		
Norte	Agrofood; Textile and clothing; Wood; Leather		Electronic white production line	
Valencia	Agrofood; Metallic products; Textile and clothing; Wood; Leather and footwear	Tiles	Automotive	
Saxony			Automotive and supplier; Technical textile; Machine building	Biotechnology; Biomedicine; ICT
Emilia Romagna	Furniture; Agrofood; Footwear	Tiles	Machine tools; Automotive; Mechanics; Food machinery	Biomedicine
Lower Austria	Agrofood; Wood		Machinery Automotive	
Western Finland			Electronic industry	ICT; Biotechnology; Biomedicine
London			Automotive	ICT

Source: Own elaboration from the information provided by regions.

Training of human resources

Tertiary education in **Moravia-Silesia** involves three public and one private university. Around 35,000 students attend these universities, 44.0% of them studying technical subjects and 26.0% of them studying economic sciences. The number of university students has gradually increased and the structure has adjusted to meet popular demand. The current problem in the labour market – to increase the

employment rate – requires universities to adapt their study programmes to the continuous changes in demand. The adaptability of the workforce to market needs is very low, especially for employees who were made redundant from large businesses. The education system is not flexible in terms of offering graduates qualifications based on market needs. Many qualified and educated people leave the region to seek better conditions and jobs in other parts of the country and abroad. Lifelong learning is receiving a lot of attention from both professionals and the public administration.

The **Northern Region of Portugal** has five public universities and associated research centres and laboratories, four polytechnic institutes, some private universities and other research and training institutions. Due to the importance in terms of number of students, research intensity and quality, innovation promotion and support for entrepreneurship only public universities are analysed in this report. In 2003, the total number of graduate students was around 60,000, more than 6,000 master students and around 3,000 PhD students. Universities employ more than 4,000 teachers and 2,250 technical and administrative staff. The regional universities and the scientific system have made a good contribution to the modernisation and development of the region towards a knowledge economy. However, this has been accompanied by a huge increase in new private institutions (universities, high schools, polytechnic institutes, etc…) in almost every town and city in the region, offering many different courses (mainly ones that do not require heavy investments in infra-structures, e.g. laboratories), often taught by newly qualified and part-time teachers. This has had some positive consequences: e.g. it has put pressure on the education system, forcing it to react and to adapt to the new socio-economic realities and needs; encouraging the so-called democratization of access to higher education institutions; increasing the expectation (mainly in the

technical areas) of practical experience in a company as part of the university training; and emphasizing lifelong learning, training and further education, in particular in e-learning techniques and methodologies. As a consequence, between 2002 and 2004, there was an increase of almost 30.0% in the population aged between 25 and 64, with tertiary education.

The **Region of Valencia**'s higher education system is made up of five public and two private universities. In 2004, the total number of students enrolled in first and second cycle studies was 142,000 (9.7% of the Spanish university population), involving 223 study programmes for a total of 110 different degree qualifications. An additional number of 6,773 students were enrolled in 286 PhD programmes. The proportion of the population aged between 25 and 34 with higher education qualifications has increased from 18.0% in 1992 to 30.2% in 2002. The academic staff is about 10,000 teachers (approximately one per 14 students). There are no clearly defined processes to determine the requirements of the region in terms of higher education. In some cases, the offer of training programmes is determined by analyzing demand based on student applications, or tracking graduate's integration in the labour market and graduates' satisfaction. In other cases, it comes out of analysing the business sector's demand for professionals or by means of questionnaires to graduates asking about their professional careers.

Non-formal training (masters, specialist and expert programmes) differs widely among universities since they are free to set up their own programmes. Since the 1990s, Valencian universities have launched several programmes designed to help their graduates enter the labour market, including internship programmes (work experience as part of a degree course), career guidance, labour exchange, collaboration agreements

with public and private bodies, labour market observatories, etc. Universities are increasingly tending to consider this activities as a part of their policies.

Saxony has ten universities, including five universities of applied sciences, and five colleges of fine arts. At the end of 2002, a total of 9,440 in-house positions (not including medicine) were at the disposal of the universities and research institutions. Other 2,030 were available in both medical faculties in Leipzig and Dresden. In general, universities and research facilities contribute to regional innovation processes providing knowledge and supporting the transfer of knowledge for learning and innovation processes as partners in regional networks. In the current working environments, and as a result of there being a generally better educated workers, a good apprenticeship or university degree is, on its own, no longer sufficient. The trend is toward lifelong learning to keep up with ongoing changes. “Learning Regions – Development of Networks” is a programme that is being implemented by the Federal Ministry of Research in cooperation with the federal states and is supported by the European Social Fund. The aim is to promote regional learning networks (there are 72 nationwide, 5 of them in Saxony). The goals of the programme are: (i) strengthening the learner’s personal responsibility and self-management; (ii) motivating disadvantaged groups that are currently less involved in education; (iii) strengthening relations between all educational sectors; (iv) improving cooperation between education providers and users; and (v) improving the quality, quantity and structure of offerings to be oriented towards user needs.

The higher education system in **Emilia Romagna** is made up of seven universities and includes almost 6,400 teachers and researchers. 67.0% of them are

employed in technical and scientific areas. Each university is responsible for its own academic programmes. Emilia Romagna has concentrated on the setting up of highly specialized research and technology institutes rather than universities. The region plays a very important role in facilitating dialogue among the different stakeholders (industry, industrial associations, universities and scientific community and national authorities) to avoid duplication of bodies and responsibilities and promote networks of academic excellence with strong links to industry. Technical and vocational education plays a crucial role in promoting and sustaining local development. However, there are labour market tensions due to the growing number of atypical jobs with mixed duties. Changes in family structure and a general insufficient labour supply, means that young people with good educational qualifications find it difficult to get a job. This means that professional expectations may be changing.

Austria has twenty-one universities and one University Centre for Further Education – Danube University Krems, this latter being located in Lower Austria. **Lower Austria** offers 19 courses of study at Fachhochschulen (FH), eleven of which are near to become bachelor/master programmes. In 2004, there were five FHs in Lower Austria with approximately 4,460 students enrolled. FHs provide both academic and vocational training, including compulsory professional practical training in their curricula. These specialized colleges are important as they provide an extensive, practical grounding to help students meet the demands of the modern work market. For example, they offer university courses in “economic advisory professions”, “systems and information technology”, “international tourism”, “telecommunications and media” and “media management”.

Lower Austria is also home to the first post-graduate university in Austria, the Danube University in Krems, which provides a wide range of courses and masters programmes. In 2004, there were 5,197 students enrolled in more than 130 programmes.

As far as longlife education, WIFI -The Institute of Business Promotion, founded by the Chamber of Commerce, is Austria's foremost institute for career-oriented training. It runs over 3,500 school events with over 44,000 participants. WIFI offers 900 courses, with an emphasis on IT, a number of them university-style courses which provide academic qualifications. In autumn 2001 the Lower Austrian WIFI, jointly with the HTL (Höhere Technische Lehranstalten) and some vocational colleges put forward a set of IT training courses. WIFI also carries out business promotion activities which include comprehensive training and consultancy. WIFI's Career Information Centre provides both group and one- to-one sessions for young people and adults.

On their side, Lower Austria's Regional Innovation Centres (RIZ) provide tailored information and training schemes focussing on the needs of young entrepreneurs and business managers. Seminars and apprenticeships offered as part of their training schemes provide concise and practical longlife education. These training programmes cover a whole range of areas, from business studies to business English and IT courses.

Since autumn 2001 Lower Austria has been operating a completely new education model for IT jobs: the TecNetAcademy of Lower Austria. This modular, career-focused IT qualification is setting new standards in education. Graduates can be confident that they will be able to cope with the IT infrastructure in their chosen industry. They can take the development of hardware and software to decisive new

levels whilst being able to support other IT users competently. The TecNetAcademy also offers an impressive range of options for higher education.

The **West Finland Alliance** area includes four universities and eight local units of universities and has up to 40,000 students. In technical sciences, main strengths are in ICT, automation and mechanical engineering. The region's universities have faculties of arts, commerce, economics, education, medical and social sciences, and the only one faculty of physical education in Finland. One of the WFA regions has an institute for rural research and education.

Seven polytechnic institutions and two polytechnic units in the WFA area offer education in commercial sciences and engineering, natural resource studies, health care and social work, travel and catering. They provide education for over 50,000 students per year.

Finland -and specifically the WFA area, has very versatile and well developed longlife training and education offerings. There are many organizations involved and many different training programmes on offered; in fact, there might actually be an oversupply. Companies' needs should be considered carefully in the design of new programmes. Most education organizations do this well, as it is the case of Edutech (the Centre for longlife education at Tampere University of Technology). One of the problems is that SMEs in particular find it difficult to articulate their training needs and they are often unfamiliar with what universities may offer. A second problem is that SMEs cannot afford to have in house tailored training and they are not prone to design long-term strategies for development of personnel . Universities must be proactive since they have the knowledge and know-how, and should lead the way in showing how it can be transferred to enterprises. Too many companies want to recruit full qualified

professionals straight from school, and are not willing to provide them further training. Thus, many of the training projects by universities focus on the development of international competitiveness, quality, and raising of know-how in personnel.

Many universities have developed recruiting models for their students by working in summer holidays, having work placements in companies and prepare their master theses. These work experiences may become permanent placements after graduation.

London has 42 universities and colleges that account for most Higher Education activity in the region. This mix includes University of London Colleges, new universities that were former polytechnics, and creative arts institutions. More than 290,000 students are enrolled at its universities, a community equivalent in size to a medium-sized city. Approximately one third (32.0%) of the total are at University of London colleges, and more than half (55.0%) are enrolled in one of the new universities.

There are around 24,000 teaching and research staff, 18.0% of them at the new universities, and 55% at the University of London colleges. Figures for numbers of post-graduate students are incomplete, but show that the median average proportion in total students is around 30.0%. On average, graduate-level qualification rates are significantly higher in the London region than in the UK overall, but at intermediate technical and vocational levels, London lags behind the national average. There are different initiatives to support students' transition into employment such as careers guidance (all universities have their own in-house service), fast-track and part-time programmes, professional courses (executive education, vocational short courses), adult learning programmes, enterprise and start-up courses, etc.

R&D resources

Table 4 presents the internal R&D expenditure and number of R&D researchers for each region and country. Lower Austria has the highest R&D spending as a percentage of GDP (1.50% of GDP) followed by Emilia Romagna (1.28%) and London (0.96%). The Region of Valencia comes next with 0.87% of GDP and Moravia-Silesia and the Northern Region of Portugal have similar figures with 0.70% and 0.67% respectively. When compared these rates with their respective national ones, it can be seen that in all regions R&D spending was generally lower than national spending, except in the case of Emilia Romagna (1.28%, compared with 1.17% for Italy).

In terms of the R&D spending structure, universities account for a high share of total R&D spending in the North of Portugal, Valencia and London regions. On the opposite, companies account for the highest participation in Moravia-Silesia and Emilia Romagna. These regional R&D spending structures as a percentage of GDP diverge from the national ones, except in the case of Northern Portugal. In the national structure of R&D spending, a high participation of government in the Czech Republic is remarkable.

There is little information on the number of researchers as a percentage of the active population, but regional and national structures follow similar patterns: There are a relative high number of researchers in universities in Valencia and Northern Portugal; and relative high number of researchers in companies in London, Austria and Western Finland.

Table 4. Resources allocated to R&D, 2003*.

	VLC	SP	LON	UK	LWAT	AT	MSR	CZ.R.	E-RO.	IT	NT	PT	WFA	FI
R&D expenditures *(% GDP)*	0.87	1.10	0.96	2.00	1.50	2.25	0.70	0.74	1.28	1.17	0.67	0.78	n.a	3.52
Firms	0.30	0.60	0.38	1.33	n.a	1.51	0.56	0.28	0.77	n.a	0.23	0.26	n.a	2.47
Government	0.10	0.17	0.12	0.27	n.a	0.13	0.05	0.33	n.a	n.a	0.03	0.13	n.a	0.36
Universities	0.47	0.32	0.45	0.40	n.a	0.61	0.09	0.13	n.a	n.a	0.41	0.39	n.a	0.69
(percentages)														
Firms	34.48	54.55	39.23	66.70	n.a	67.30	80.00	37.83	60.00	n.a	34.33	33.33	n.a	70.11
Government	11.49	15.45	12.94	13.50	n.a	5.70	7.00	44.53	n.a	n.a	4.48	16.67	n.a	10.09
Universities	54.02	29.09	47.29	19.80	n.a	27.00	13.00	17.64	n.a	n.a	61.19	50.00	n.a	19.79
R&D researchers *(by 1000 active population*)	4.10	4.80	n.a	n.a	n.a	11.20	6.23	6.62	n.a	n.a	3.50	4.70	n.a	n.a
Firms	0.96	1.50	n.a	n.a	n.a	7.69	n.a	n.a	n.a	n.a	0.90	1.10	n.a	n.a
Government	0.52	0.80	n.a	n.a	n.a	0.66	n.a	n.a	n.a	n.a	0.20	0.90	n.a	n.a
Universities	2.58	2.50	n.a	n.a	n.a	2.84	n.a	n.a	n.a	n.a	2.40	2.60	n.a	n.a
(percentages)														
Firms	23.41	31.25	75.00	89.00	n.a	68.70	n.a	n.a	n.a	n.a	25.71	23.40	59.00	53.03
Government	12.68	16.67	25.00	11.00	n.a	5.90	n.a	n.a	n.a	n.a	5.71	19.15	5.83	13.97
Universities	62.93	52.08	n.a	n.a	n.a	25.40	n.a	n.a	n.a	n.a	68.57	55.32	35.16	32.98

**Saxony and Germany are not shown because information is not available for each row.*
***In the case of London and the UK, the % of researchers in the Government sector does also include the ones from the university sector.*
Source: Own elaboration from the information provided by regions.

3. University-industry cooperation characteristics

This section focuses on the main regional actors involved in the university-industry cooperation and the relationships among them.

Actors

Academia in **Moravia-Silesia** is represented by four universities (three public and one private). They play an important role in regional development concerning the increasing of technological levels, labour productivity and industry competitiveness, but they do not necessarily respond to regional needs or exploit the potential of the region.

In the context of university-industry cooperation, the Technical University of Ostrava is very important as far as supply of human resources is concerned and in orientating R&D to cope with the technical, economic and ecological problems in the region. In addition, there is a special group of institutions that focus on direct support to innovation, although the transfer of technology and of R&D results are still in an implementation phase. This group includes five research institutions: the Centre of Advanced Innovation Technologies (CPIT), which is the most important technological innovation centre; Ostrava Science and Technology Park; a business innovation centre in Ostrava and a regional innovation centre in Frydek-Mistek district.

SMEs and microfirms are characteristic in the business structure of Moravia-Silesia. In 2003, 223,000 companies were registered in the official statistics. However there is a lack of entrepreneurship in the region – the number of private businesses per 1,000 inhabitants is the second lowest in the country. The location of firms in the region is uneven, especially in terms of SMEs or enterprises with less than 500 employees. The Ostrava-mesto administrative district has the highest number of economic units, in all size categories while the Bruntal district has the lowest –only about a third of the

number in Ostrava-mesto. There is a total lack of data or indicators on the innovative features of industry and the regions.

The scientific and research system of the **Northern Region of Portugal** is made up of a nucleus of five public universities and their associated research centres (around 186 research institutions). These entities carry out R&D in several scientific areas through projects or research contracts in partnerships with national and international networks of excellence. In 2003, their total budget amounted 9.7 million euros and 2,164 PhD researchers were employed in them. In addition, new private institutions (universities, high schools, polytechnic institutes, etc…) have been established in the region, but few of them are engaged in research. Regarding the business structure, in 2003, there were 207,571 companies -99.5% of them SMEs, that were generating around 34.6% of total employment (1.1 million workers), 27.0% of the overall turnover (77,796 million euros) and 26.6% of the GVA of the Region (17,402 million euros).

The socio economic fabric also includes other important actors, such as local governments, public companies, hospital and health care centres, non-profit private associations and private welfare institutions.

In addition, there are four industry oriented Technological Centres (textile and apparel, shoemaking, cork, and metal), created through partnership initiatives between government agencies and industrial associations, These centres often develop pilot and innovative training, R&D projects and intellectual property management and play a relevant role in the modernization of companies.

The higher education sector in the **Region of Valencia** plays an important role in the regional innovation system. It is made up of five public and two private universities.

In 2002, the total budget for the public universities was about 839 million euros (1.2% of the Region's GDP) what meant about 5,900 euros per student; about 100 million euros were allocated to research activities (wages and other personnel expenditure not included). 21.0% of R&D budget was funded by the private sector and 79.0% by the public sector.

Public R&D centres include 10 R&D institutes belonging to the Spanish National Research Council – CSIC and 6 institutes and foundations dependent on the regional administration.

Business structure is mainly characterized by SMEs and microfirms operating on labour-intensive activities. Only a very small number of companies –all of them of small size, are involved in high technology and knowledge-intensive industries (pharmaceuticals, electronics, ICT, etc.). Expenditure on innovation by Valencian firms in 2003 was 1.2% of GDP -below Spain's level (1.5%) and mainly consists on the acquisition of machinery and equipment, and to a lesser extent in R&D activities. However applications for high-technology patents submitted to the European Patent Office (EPO) by Valencian applicants in 2003 were above the national level (4.3 and 3.6 applications respectively per million people in the labour force).

Fourteen Technology Institutes (TI), jointly promoted by the Valencian government and industries, enhance innovation by offering infrastructure and services for cooperative R&D, technology transfer, technical consultancy, information and documentation, laboratory tests and quality certification. They are also active in promoting international co-operation and participation in EU programmes on R&D, technology transfer and training. Most of TI are industry oriented to important traditional manufacturing activities in the region (footwear, textiles, furniture, ceramics, etc.) but some others are technology oriented towards areas such as biomechanics,

optics, IT or electricity and new energies. About 7,000 firms were affiliated to industry associations from which IT are dependent of.

Finally, four European Business and Innovation Centres (BIC) promote entrepreneurship and new innovative activities throughout the region.

The base of scientific research in **Saxony** are five universities and five applied sciences universities. Universities in Saxony have recently redefined their main focus of research because of scarcity of public funds and growing competitive pressure among universities. Research objectives are well aimed towards the regional industry, which is an advantage for cooperation with companies.

The existing public research infrastructure is supplemented by industrial research. 99.7 % of the 145,561 enterprises in Saxony are SMEs -128,471 microfirms with less than 10 employees, 14,019 employ between 10 and 49 employees, and 2,651 enterprises have between 50 and 249 employees. Thus, SMEs are the backbone of the Saxon economy, but their limited human and financial resources mean a difficulty to access to R&D results. In 2001, there were more than 10,100 employees in companies of all branches across Saxony who were responsible for R&D. The largest research potential was in machinery, service provision, R&D, radio, television and communication technologies and in the automobile industry. Two thirds of researchers are working in enterprises with less than 250 employees. Three quarters of organizations involved in R&D are maintaining, cooperative relations with other companies, scientific or technology institutions, or other partners. Almost one third of total sales of enterprises engaged in R&D come from exports.

Saxony also hosts 24 research institutions, and around 33 technological centres, which act as important links between basic research and industrial application.

Research in **Emilia Romagna** represents a modest 5.9% of total Italy's R&D resources, but it accounts for 15.0% of national scientific production. In addition to seven universities, the National Research Council -which includes seven Institutes, eight Sections, five Strategic Projects and the Bologna Research Area, adds 800 researchers, scholarships holders, contract researchers, final-year university students, and technicians. The public R&D system in Emilia-Romagna is made up of over 300 research centres and more than 7,800 public researchers, accounting for 10.8% of the Italian total. If the R&D staff working in businesses is taken into account, the number of researchers rises to 12,700 accounting for 8.7% of the Italian total. About some 30 organizations are engaged in technology transfer activities.

Emilia Romagna ranks first in Italy in terms of number of laboratories certified by the Ministry of University and Research with 249 public and private certified laboratories out of a national total of 1,881. One out of four private companies in Emilia-Romagna are currently using the public network of laboratories for services such as testing, certification or analyses not included in research projects.

Emilia-Romagna has developed as a metropolitan region wherein small and medium sized urban areas are functionally integrated with an efficient social and economic infrastructure that keeps together a dense network of manufacturing and service enterprises and allows to industrial production be efficiently organized in a number of highly-specialized productive districts. Industrial machinery is the most developed sector accounting for 25.0% of total manufacturing businesses and approximately 50.0% of the total workforce.

There are over 400,000 enterprises in the region (one for every 10 inhabitants), 80.000 of them in manufacturing activities. Over 130,000 businesses are micro-

enterprises, and there are about 3,000 cooperatives. 97.0% of all companies have less than 20 employees.

The scientific and research system of the **West Finland Alliance** area includes four universities and eight local units of universities, whose main task has traditionally been basic research. In addition, there are seven polytechnic institutions and two polytechnic units, which were not originally established as research institutions but have become engaged in applied research, particularly in the field of technology. These units work closely with businesses and receive an increasing number of private-sector assignments. There are also seven technology centres, which, among other things, are responsible for the national centre-of-expertise programmes in the WFA regions. These programmes cover energy and environmental technologies, food processing technology, health-care technology, ICT, materials technology, mechanical and automation technology, and paper-production technology. Biotechnology is gaining momentum. The Technical Research Centre of Finland, VTT, has a number of research institutes located in WFA regions.

Regarding business structure, the total number of businesses in WFA in 2004 was 62,000, with 525,000 workplaces. Primary sector provides 5.0% of employment, manufacturing activities 33.0%, services account for 60.0%, and the remaining 2.0% of the workforce is employed in other kinds of activities. The area contributes nearly 26.0% of Finland's GNP. A significant part of research in the country is done by companies. In 2002, investment in R&D totalled some 4.8 billion euros, of which businesses contributed 73.0% (3.5 billion euros). In addition, WFA accounts for several technology centres and sciences parks, several public business incubators and one private business incubator.

Lower Austria is home to the Danube University Krems, the leading national university for postgraduate education in Europe. Its range of courses leads to full academic degrees. Collaborative schemes established with the best universities and research institutes guarantee a fruitful exchange within the scientific community.

In order to widen the scope of higher education, study courses offered at Fachhochschulen (FH) have become considered as higher education although grounded in practical learning. Lower Austria's WIFI and RIZ have promoted longlife education. In addition, there are three main centres for technology focussed on modern industrial technologies (environment, agro-biotechnology and biotechnology) that offer research and university training in a business park favouring direct technology transfer from science to businesses.

Lower Austria is host to 298,772 enterprises. 50.1% have no employees; 40.0% have 1 to 9 employees; 8.1% employ between 10 and 49 employees and only 1.8% have more than 50 employees. Large companies' main products are machinery, wood and food. Lower Austria has a long industrial tradition and innovation flows smoothly throughout operating networks among companies. Hence, cross-company alliances and clusters or units of allied companies are focal points in Lower Austria's economic policy. These initiatives are enabling the region to devise new ways of promoting commerce focussing efforts in improving the performance of companies and groups of companies to grow in line with future challenges.

Clusters have become an expanding network wherein close personal and business cooperation lead to win-win results. *Ecoplus* is responsible for seeking out potential clusters in Lower Austria. Its task is to track down possible cooperative alliances, analyse their viability and bring cluster initiatives through the initial phases of development. Each cluster is invited to set suitable targets for cooperation projects and

help is provided through the initial stages by means of guidelines to facilitate their task. By the moment *Ecoplus* has created five clusters: Holz Cluster Niederösterreich; Automotive Cluster Vienna Region; Wellbeing Cluster Lower Austria; Ecological Construction Cluster; and Synthetic Material Cluster. Further clusters in evaluation are food and logistics.

In **London**, this study focuses on the 21 universities which account for the majority of university-industry activity out of the total number of 42 higher education institutions. There is often a general distinction made between the more heavily research-based universities, and the teaching universities such as London South Bank which are former polytechnics.

Beyond teaching and research, all universities are engaged to some degree in income-generating, commercial activity. There is of course a distinction to be made between pure funded research and applied research, consultancy and knowledge transfer. Total higher education funding in London exceeds €2 billion a year. The aggregate research budgets of the universities is about €415 million.

Universities in England are mostly publicly funded through the Higher Education Funding Council for England (HEFCE) and UK Research Council budgets, as well as discretionary schemes. In most universities the amount of private sector funding (aside from student fees) is relatively small. A large number of research awards is available in London, but these highlight the strength of the institutions in the capital and are not related to the industrial or commercial interests of the regional economy.

London's research base therefore is much more directed towards national and international research interests.

The university-industry collaboration taking place within the London region reflects the changing nature of the London economy which has been described elsewhere in this report. London has nine Technology Centres which seek to build direct links between learning institutions and enterprises. These centres focus on knowledge transfer.

State of University-Industry cooperation

In **Moravia-Silesia** university-industry cooperation is often carried out in an ineffective way. Analyses of cooperation between universities and industries show many differences on both sides, which could be termed "cultural differences" regarding perception of timeframes, status and merit bonuses. Problems that have been detected are the following: (i) communication barriers –universities are unable to offer their activities, and companies cannot adequately define their needs; (ii) there is mutual distrust regarding the benefits of cooperation, as well as lack of interest in creating the conditions for effective cooperation; (iii) cooperation between universities and regional authorities as well as professional chambers is inadequately defined and specified, which significantly influences the innovation processes in the region; (iv) insufficient participation of universities in the drafting of strategic documents concerning human resources development at regional level.

These barriers to cooperation will be difficult to overcome without reforms that provide motivation for closer cooperation between universities and companies. The

most frequent type of cooperation is short term contracts for solving specific technical issues, with no follow-up. Additionally the regional R&D system is not well adapted for a successful transfer of R&D results.

In general, Moravia-Silesia does not hold the competencies that would allow a more effective influence in the development of R&D institutions or in the managing and financing of the R&D system in its territory. However, it can act by means of supporting the existing R&D system through coordination of activities, support in information and communication matters, promotion of regional marketing and, to a certain extent, the funding of R&D activities. The system of R&D support in the region is based on the cooperation between the regional administration and organizations and institutions working in R&D on the one side, and those that want to support this process or use R&D results for their own development on the other.

In the **Northern Region of Portugal**, despite the many adverse conditions and obstacles, university-industry cooperation has increased and shows high potential for further development. The obstacles to cooperation include: (i) Portuguese R&D budget and its distribution are unfairly skewed in favour of the capital, Lisbon, for all indicators; (ii) R&D policies and their implementation practices, have, since Portugal had access to EU funds, been misdirected, generally because they have mostly been directed to supporting supply rather than demand; (iii) the existing university legal framework affecting teacher/researchers is inadequate with respect to the current industry needs; (iv) the average level of qualification of entrepreneurs and the industrial workforce is generally low and far from that of the direct international competitors.

The commonest ways of cooperation are development, technical support, consulting, auditing, advanced training, and to a lesser extent technology transfer and

support of technology-based start-ups. However, since June 2006, five innovative business projects have been initiated in areas such as dental health, eolic energy, food, and keyboard design. University interfaces such as technology transfer centres, technology institutes, training centres, entrepreneurship promoters, intellectual property management offices, are important.

On the opposite, in spite of some early experience and initiatives and the growing interest among local governments (municipalities), there is no tradition of science and technology parks in the Northern Region of Portugal. Notwithstanding, two new science and technology parks are being built and will become operational in the near future. It is expected that these parks will foster higher levels of cooperation and integration between universities and industry. There is consensus in Portugal on the importance of business innovation for promoting entrepreneurship, with particular focus on knowledge-intensive companies.

In recent years, universities in the **Region of Valencia** have made considerable efforts to strengthen their "third mission", i.e. cooperation with the socioeconomic environment. The setting up of interface structures and other instruments to promote university-industry relationships have been part of these efforts. All publicly-owned Valencian universities have technology transfer offices (TTOs) to manage university-industry relationships. Resources allocated by Valencian universities to TTOs have almost doubled in the last five years, mainly by increasing their permanent staff. This is an indicator of universities' keenness to promote development of applied results from their research, by means of knowledge and technology transfer. Furthermore, each university has its own promotion mechanisms for the management of their technology developments and external relationships: at an institutional level these are

responsibilities of a university's vice-chancellor; and at the operative level they are managed by the university's interface structures and TTOs.

Regarding to the most common ways to operate transfer of knowledge to stakeholders, "technological support and consultancy services" and "R&D contracts" are the most commonly used instruments. When analysing the demand of university services by regional businesses "R&D contracting", "technology support and consultancy services" and "training under specific demand" are frequently recorded, whilst demand for "patent licences" and "support for starting up new companies" is much lower.

On the other hand, in terms of collaboration of universities with other R&D agents in the Region of Valencia *Research Institutes* and *Technology and R&D Institutes* emerge as the most relevant ones. Valencian universities are also developing other cooperation mechanisms to enhance business development of their R&D activities by means of the setting up of science parks and spin-off programmes.

The Region of Valencia hosts a Technology Park currently housing nine Technology Institutes, one Business and Innovation Centre, some business schools, and a number of advanced technology manufacturing and service companies.

Entrepreneurship programmes in Valencian universities are still in their infancy. It should be noted that R&D-based entrepreneurship among the university community involves a cultural change and, hence, time commitment and continuous attention.

In **Saxony**, university-industry cooperation is generally an effort aimed to improve regional competitiveness and create jobs. Thus, much of university-industry cooperation becomes as a result of external incentives such as public programmes. Networking is a common feature in many policies in Saxony. Land of Saxony

government's departments tend to use networks as an instrument to achieve their specific objectives and reach their target groups –e.g. industry, medium-sized business, technology policy, training and longlife education. In this way networking is commonly being used as a public action instrument making it difficult to highlight spontaneous individual cases of cooperation between science and businesses. Additionally, support to enterprise start-ups is gaining importance as a regional policy, and universities are playing an increasing role in it.

In the last decades the productive and economic system of **Emilia Romagna** has been developing towards a knowledge-based economy. As the result of a well organized manufacturing system, good technical competences and innate problem-solving capacities, the regional actors began to networking in a more or less spontaneous way, concentrating competencies and knowledge at the local level. Since 2002 the Regional Authority started to pave the way for the Regional Programme for Industrial Research, Innovation and Technology Transfer (PRRIITT). The main aim of this programme is to create a research network within Emilia Romagna with the objective of gathering together the research and business actors, sustaining research–to-business cooperation and creating new R&D jobs. This Plan is allowing Emilia-Romagna to be one of the most successful European regions in innovation, bringing it the prize for "Regions of Excellence" in 2004 and 2005.

The main strategies adopted by the Regional Government of Emilia Romagna to encourage and support a knowledge economy are: (i) provision of financial support and incentives to enterprises based on market-oriented criteria, i.e. identifying specific sectors that are crucial for regional competitiveness or that offer good prospects for future development; (ii) fostering university-industry cooperation by supporting

cooperative projects, the creation of industrial laboratories and innovation centres; (iii) supporting new jobs in R&D.

Significant transformations have taken place in the industrial structure of the region. These include a reduction in the number of manufacturing firms and employment; the emergence of new hierarchies, with the rise of leading firms, business groups and distant networks; increased divergence in the performance of the different production systems in the region; and an intermingling of old and new technical competencies to meet the challenges of the ICT revolution.

The integration within hybrid structures of academics and industrial R&D personnel, working together on specific issues and cases, has produced positive results in aspects such as: (i) innovative advanced in mechanics, and particularly industrial robotics, (ii) the promotion of high-quality interdisciplinary research; (iii) improved quality of higher education, with the introduction of innovative and practice based training experiences in mechanical design and the finding of new employment opportunities for graduates in design-related areas.

Networking appears as a way to gather a critical mass to achieve joint competitiveness. In this sense, it represents an application of the principle of subsidiarity which induces the actors to cooperate to improve their competitiveness beyond their individual possibilities.

Lower Austria has a great potential for innovative, technology-oriented business start-ups. Training programmes and consulting centres help new entrepreneurs to develop their business plans. A start-up scheme (GENIUS) is financed by the Lower Austria's Department of Business Promotion. GENIUS brings together public experts on academic education and research, and on business training. Cooperation between

GENIUS partners means that services and facilities for new business initiatives have become more coherent and better targeted. In addition, the Department of Business Promotion and GENIUS partners are able to offer more self-driven sponsorship programmes and start-up investment.

The Chamber of Commerce start-up services, based in a number of districts, offer professional support to new local businesses in the first stages of establishment.

RIZ, a well established consulting agency for start-ups owned by the regional government of Lower Austria in Lower Austria, provides counselling and professional guidance during the first three years of business activity. RIZ offers help in the drafting of business plans and advice on finance and appropriate business locations. Ten RIZ incubators are located throughout the country where business offices and production facilities can be rented.

As far as universities are concerned, their attachment to their traditional "freedom of scientific research and teaching", makes them to have quite different goals from enterprises. Additionally they are financially dependent on the Austria's Federal government and SMEs tend to consider the "university scientific language" as a hurdle. All this together makes not easy the dialogue between university-industry.

In **West Finland Alliance**, SMEs not that often seek cooperation with university or other research institutes but the ones that do cooperate are very active and usually run several co-operation projects at the same time. In many companies, there are reluctant attitudes towards universities and unfamiliarity with the world of academia becomes a barrier to cooperation. Similar problems arise concerning the fostering of innovation, the best way for it being the training of personnel to improve their expertise.

Tekes (the main public funding organization for R&D in Finland) is in charge of co-ordinating many national and regional projects involving SMEs and designed to develop SMEs; Usually one or two large companies become included in Tekes projects, favouring recognition of the projects and visibility and providing global knowledge about industry from which SMEs can benefit. A research institute -either a university or a public or private research unit, is always involved in these projects. In fact some of a number of projects are started as research projects and businesses join to them in a further stage when innovations are to be carried into practice. Tekes' objective is to get a research institute and a group of companies involved in each project. One of Tekes' objectives is to enhance SMEs to take advantage of knowledge in universities by fostering cooperation between them. A strategy for this objective is enabling students to prepare their graduation theses while working on projects undertaken in SMEs. Thus, the most common way of cooperation with SMEs are graduation and master's theses projects. Large companies often hire students working on doctoral degrees.

There are no statistics on the transfer of knowledge from universities to companies, since new technologies and innovations flow to the companies through unofficial channels and companies do not give direct feedback to the universities. However, cooperation has shown to produce results: SMEs that work in close cooperation with universities tend to grow and develop faster and to be more successful.

Among universities, Tampere University of Technology (TUT) is a research and knowledge-based university that aims at developing both its own activities as a university as well as promote innovation in businesses in its local area. All institutes inside TUT have a long tradition of co-operation with industry and well established links with companies. On the other hand, research programmes and technology programmes are used to promote development in specific sectors of technology or industry, and to transfer results of the R&D work to businesses. These programmes

promote co-operation and networking among companies, universities and research institutes, as well as the strengthening of technology transfer and international expansion.

In **London** there are at least 55 university-based external liaison offices that could be making contact with businesses and employers at any one time. Most of the London universities have at least two offices making regular contact with regional businesses – the "careers development" office and the "business services" office. Central university management may also have strategic or sponsorship links with larger companies. The central business services unit may deal with contracts but the cooperation and development of external relations is done at academic staff or department level. There is less of a tendency for business services staff to pro-actively "sell" the university's services to external clients. What is uncertain is the degree of co-ordination within a university between these different points of contact, as perceived by the business, e.g. a member of the careers service staff would normally deal with the human resources/personnel department of a company, but a course provider elsewhere in the university may be directed towards the same company's human resources department to offer university training schemes.

In general, university-industry links tend to be conditioned by the initiatives, programmes and funding implemented by public authorities to enhance university-industry co-operation. Conditioning tend to be less likely in specific areas where university-industry collaboration would be more clearly mutually beneficial (e.g. workforce development, product/service design and development, planning and business strategies, etc.).

In terms of university-industry activities, the general picture is that research and consultancy is the largest source of income but more than half of this is with non-

business clients. Professional development courses are the second largest source of income, but universities account for only 5.0% of the total business training market. Innovation, patent licensing and other ways of technology transfer constitute a smaller source of income nationally, and in terms of business relationships are more prevalent in computing, bioscience and other technical fields.

With respect the presence of science or technology parks to promote cooperation, London universities have a scarce supply of affordable land and premises for science park development. Some universities have office space that they rent out and may result in a cluster of similar technology companies, while other have or are developing small incubation space within innovation centres. But much of this activity is not highly visible or large scale.

4. European, national and regional innovation policies

Current economic and political trends have renewed interest in regionalism in almost all EU countries, which has favoured regionalization and de-centralization of state power. De-centralization allows the adjustment of policies to meet local realities and maximize its possible impact. In this sense, regional and local authorities are taking on an increasing role in the enhancement of innovation and regional development. This section provides an overview of regional and/or national innovation policies in the regions analysed, focusing on those policies with higher impact on university-industry cooperation.

In **Moravia-Silesia** institutional support for innovation activities in the region currently comes from three levels: European Union bodies; Czech goverment; and regional authorities. These programmes are provided under different conditions but in general, their effective use is conditioned by the ability and willingness of users to introduce innovation into their business plans. In Moravia-Silesia there is only one institute -the Institute of Geonics in Ostrava-Poruba, which belongs to the Czech Academy of Sciences, working in bridging basic and applied research. Research in universities is targeted on academic criteria focussing on publications and citations rather than on application into practice. In most EU countries, universities are leaders in developing innovation enhancing activities connected with the economic characteristics of their regions. In this way, they can pursue solutions which although do not bring immediate economic effects may offer a high potential for the future. On the oppossite universities in the Moravia-Silesia do not aspire to this role, although they could naturally take it over.

There is no integrated infrastructure in Moravia-Silesia to provide institutional support to innovative businesses. Some potential elements would contribute to creating a simplified infrastructure for this purpose but it will be necessary to overcome strong institutional resistances based on fear of losing independence in decision-making and functioning and on inexperience with purpose-built (often virtual) strategic alliances.

Regarding to policy instruments to foster university-industry co-operation, a number of measures have been proposed on different items: organizational (drafting of new innovative ideas, business plan, etc…), information (building up a publicly accessible and commercially-useful information system), marketing (market research on current needs and requirements of potential customers for innovative SMEs that are not able to conduct this research by themselves), personnel (targeted training and opportunities to get professional qualifications), financial measures, and so on. Implementation of these measures is a condition to achieve the main goal, which is to establish a regional innovative market.

Portugal is divided for administrative purposes in five regions with non-elected regional administrative bodies -**Norte**, Centro, Lisboa, Alentejo and Algarve, and two autonomous regions -the archipelagos of Azores and Madeira, with elected regional governments and a high levels of decentralization. Except for the specific situation of the Atlantic archipelagos of the Azores and Madeira, Portugal is not a regionalized country. So, all the major policies (e.g. economy, education, R&D, health and welfare, social security, internal security, etc) are decided by the Portuguese government for the whole national territory and held, defined and, to a large extent, implemented by its agencies and departments, some of them having regional branches that have basically a front desk role.

Concerning university-industry relations four ministries define and coordinate policies influencing on this matter: Ministry for Science and Higher Education, Ministry for Economy, Ministry for Education and Ministry for Social Security and Labour. These ministries' policies are managed by public agencies responsible for implementing information society and e-government policies. Focusing on the national innovation policies active in the **Northern Region of Portugal**, and besides initiatives, actions and lobbying performed by actors involved in university-industry cooperation, two regional bodies can be highlighted as being involved in coordination (and also in lobbying): CCDR-N (North Region Coordination and Development Commission) and DRE-N (The Northern Delegation of the Economy and Innovation Ministry).

In addition, Norte Region includes a large number of municipalities, endowed with autonomy regarding the specific interests of their populations, but having little influence over policy-making. New instruments of administrative decentralization have been initiated by the Metropolitan Areas and Intermunicipal Communities, to which some responsibilities, previously attributed to Central Government, are being transferred. Currently, only the municipalities of Porto and Lisbon are associated into Metropolitan Areas; however, new metropolitan areas are being created, including Minho in the Norte Region.

Since 1978, Spain has undergone a fast and deep process of de-centralization; its Constitution established the so-called "State of the Autonomies", by which Spanish regions acquired quasi-federal legal status allowing them to take on major responsibilities and giving them more power over resources. Since the 1980s, a delicate equilibrium has been established among transferred competencies, non-transferable competencies (those reserved solely to the central administration), and shared

competencies. The situation is more complex when competencies are shared and their management is transferred between different levels of the administration, which makes identification of the legal titleholder rather difficult. Statutes of autonomy –each region having its own one, usually confer the promotion of innovation and R&D as an exclusive competence of the regions, although regional policies must be co-ordinated with the National Government that is responsible for scientific an economic planning. In this way, innovation policy in Spain follows a "multilevel model" –European, national and regional. This model, which is being enhanced by the EU, emphasizes the crucial role of the regional level in promoting innovation and embedding it in the European Research Area. Innovation policy measures reach companies through a complex and sequential process in which regions, as the closest administration to companies, act as managers and performers, not only of their own programmes but also of those of national and supranational administrations (according to the principle of subsidiarity). Following the de-centralization process in Spain, by mid 80's, the **Region of Valencia** began to develop its own technology policy adapted to the socioeconomic characteristics of its territory. This policy was aimed at implementing an infrastructure to provide "real services" (advanced services) to enterprises. Basic components of this strategy were a network of Technology Institutes, the integration of public/private agents, and the horizontal/vertical coordination of economic and institutional actors.

In 1993 a Technology Plan was set up incorporating a number of different programmes (technology development, fostering of new industrial activities, support to pre-competitive R&D, etc). Technology Plan remained in force until 1997 when the kind of actions it promoted were integrated into a Valencian Science and Technology Plan. One of the distinctive aspects of Valencian technological policy has been a clear

distinction between the regulation and promotional roles of the regional government bodies regarding to industry.

Concerning science policy, its goal has been to draft and promote a science and technology policy capable of allowing the Region of Valencia to catch up with the most advanced regions in Spain and the EU in terms of public and private investment in R&D and innovation. As far as university-industry cooperation is concerned instruments at the European level converge with others proposed by national and regional authorities. Broadly speaking, they have the following objectives: (i) to stimulate the creation of enterprises by inventors, scientists and technologists who can exploit market opportunities from research results; (ii) to stimulate technological innovation among SMEs through the incorporation of scientific-technical principles to produce and commercialize new products; (iii) to encourage the generation and protection of intellectual property rights in the form of patents as a way to promote technological leadership of Valencian companies; (iv) to encourage R&D and innovation, particularly in SMEs; (v) to increase the commercialization of technological innovation through cooperative R&D and innovation.

In **Saxony,** the focus of development policy is on the fostering up and development of regional networking. Actors from industry, education and research institutions, politics, administration, associations and society are encouraged to join forces and work together in developing innovative ideas on the assumption that prerequisites for the generation of innovations -e.g. motivation, creativity and competence, can be better developed through close cooperation. An intermediate administrative level as regions are, is well suited to foster co-operation, enabling quick and effective exchange of information as well as shared learning.

An important novelty in innovation policies in Germany has been the introduction of a multi-stage competitive process that has changed the way federal states get federal funds for innovation development. Federal states are no longer awarded development funds but have to compete among them. This is reinforcing allowances to the most successful regions that are able to summit the best projects. Even though this approach has been successful and is supported by experts, there is a risk, from a regional policy point of view, of increasing divergence among regions.

In **Emilia Romagna**, the first regional integrated programme for the promotion of innovation, quality and internationalization was initiated in 2000. At that time, the regional authorities were aware that new functions and competences were needed at regional level to support and boost industrial investment. They wanted to facilitate a real 'technological leap' in the manufacturing sector, and specifically in a number of industries -e.g. advanced mechanics, biotechnology, biomedical technologies, food industry, housing, design and fashion.

At the end of the 1990s and the beginning of the new millennium, the regional government of Emilia Romagna was faced with a number of challenges and threats, including the end of the possibility of competitive devaluations when joining into the Euro zone. Regional industrial policy focused on searching for cost-effective solutions – in many cases implying delocalization of production plants, and assuring high quality and innovation in products and services. In 2001 the regional government and the regional public universities and research bodies signed a protocol declaring their intention and commitment to making efforts to consolidate the regional industrial research, innovation and technology transfer network. Emilia-Romagna R&D objectives are: (i) to contribute to the consolidation of a regional "knowledge and innovation

community"; and (ii) to support the development of networks among actors in the regional innovation system (universities, research centres, enterprises and centres for technology transfer).

The method which has been adopted to pursue these objectives is based on an integrated set of actions which affect both the demand and the supply sides. On the demand side, the actions put in place aim at: (i) fostering investments in R&D and increasing the R&D human resources employed in enterprises; and (ii) promoting the start up of new enterprises and productive activities with a high technological content/value so as to facilitate economic returns from research. On the supply side, the actions put in place aim at: (i) fostering more intense and consistent relationships between research and industry; and (ii) fostering industrial research and technology transfer in universities and research centres; (iii) developing a regional network for research and technology transfer, that involves innovation centres.

Additionally, the adoption of ICTs is considered to be a functional choice to support the advance of the regional economy within the globalized market place.

Regional policies for research and innovation have been diffused by means of initiatives and instruments that guarantee transfer to -and impact, on the regional productive system. They are effectively integrated within national and European programmes/initiatives supporting research and innovation, with specific reference to the VIth European Union R&D Framework Programme. Regional policy actions in Emilia-Romagna are based on the principle of integration with other policies with a strong territorial impact, and on the valorization of the dialogue between all actors in the region, aiming at consolidating an innovation and knowledge based economy.

Austria has a federal government system which includes Austria's Federal government and nine state governments (Bundesländer) with fairly strong political influence due to the tax income they receive directly or via federal government. Austria's entry to the EU has made additional funding available for R&D and innovation promotion but the process of coordinating the different interests involved is not an easy task. In **Lower Austria**, in 1982 after the establishment of the Waldviertel-plan as a development strategy for the region, two regional managers were appointed to deal with it.

Since the mid 1980s, this regional management has implemented many projects through targeted initiatives. The focal point has been, and still is, the promotion of cooperation projects, such as the association for special crops and animal husbandry, which allows thousands of farmers to produce in accordance with uniform guidelines and market their goods jointly under the umbrella brand name "Waldland". Similarly in the tourism sector, all actors have been brought together within one working platform.

In 1993, the "Waldviertel Telehaus" was set up, with the major objective of marketing regional products and services jointly and more effectively. Aided by new technologies, a new phase is being embarked upon in the field of regional development. Twelve regional development targets have been defined and are being monitored: (i) strengthening of the research and technological development (RTD) potential of SMEs; (ii) innovation-focused infrastructure, and technology transfer; (iii) starting up and development of technology-oriented new firms; (iv) support for business location and re-location, and business parks; (v) virtual support, business cooperation and networks; (vi) support for opening up new (international) markets; (vii) modernization and improvement to existing enterprises; (viii) development of tourism and cultural infrastructures; (ix) cooperation of regional actors, non-government organizations

(NGOs) and communities; (x) increasing energy and natural resources efficiency; (xi) improving the attractiveness of villages and small towns; (xii) strengthening and improving transportation of goods. Based on these targets it is clear that innovation and cooperation are considered to be important. However, they make no explicit mention of university-industry cooperation.

In the **West Finland Alliance** area, the Regional Councils -which are the regional development authorities, have the main responsibility for regional development under Finnish law. However, the development of regions is in practice the result of cooperation between many regional, national and even international actors. Regional strategies, programmes and annual action plans are drawn up in collaboration with actors involved in the overall development of the region. Thus, Regional Councils set the directions and assume leading positions in regional development. The primary responsibility for land use planning and overall regional planning lies with the Regional Councils. However, as this has wide-ranging effects on different actors and residents in the area, hearings involving different bodies are a part of the planning process and feedback is considered in the drafting of final plans. The councils take care of regional development by compiling the EU's structural programmes and overseeing their implementation in collaboration with the Employment and Economic Development Centres, the Environmental Centres, the Road District Offices and the Provincial Offices. In addition, national funding assigned to the Regional Councils is used to initiate local and regional development projects. The regional councils have created an international co-operation network and are responsible for international cooperation in their particular fields.

WFA does not have an Innovation Policy, but a project, WFA-INNO, has been established to facilitate the development of innovation procedures in WFA areas. The aim of this project is to ensure that Western Finland area remains at the forefront of technological change based on international standards, and to create a structure that connects universities, businesses and public administrations in the region and gives support by producing up-to-date and reliable information on technological development and on demands posed by the innovative working environment. The project consists of five regional pilot projects, which aim at developing regional competitiveness concepts, and a common project to create an information system for data on competitiveness and for the offering of services to enterprises. The web based tool created in the project will enhance the transfer of expertise and technology from the producers of knowledge to those who need it.

London re-established a degree of regional government autonomy in 2000 with the creation of the Greater London Authority (GLA) made up of an elected London Assembly and the new office of the Mayor of London. For practical purposes the London Development Agency (LDA) which reports to the Mayor is also part of the GLA.

Higher education policy is in the sole competence of central government. However, at the regional level, innovation and competitiveness policy come within the remit of the LDA which also has an interest in strategic planning in skills development. Also the LDA does distribute funding to higher education institutions to support enterprise and knowledge transfer activities.

Policy tools to enhance university-industry cooperation are identified through national and regional schemes:

i. at the national level activities have been set up to boost the capabilities to respond to the needs of both small and large businesses. In addition, the Higher Education Innovation Fund supports universities in knowledge exchange and interactions with business, public sector organisations and the wider community.

ii. at the regional level there has been a multiplicity of programmes, chiefly facilitated by the LDA, to support London's businesses from which university-industry working initiatives can and do benefit.