

The role of research in regional smart innovation

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Executive Summary

Working in partnerships is increasingly seen as the best way to reap benefits from RTDI policy interventions, because partnerships increase added value through synergies, externalities and minimisation of overlaps. Networks have been promoted in the European Union (EU) for decades and experiences and evaluations have taught policy-makers a series of lessons that are taken into consideration in the most recent Europe 2020 Strategy. The most relevant among those lessons are to make partnerships more focused, to make flagships out of them instead of thinly spreading resources and to give the partners the necessary means to meet their objectives.

Both global competitive pressures and the financial crisis are reinforcing the need to build partnerships that increase scale and at the same time offer opportunities for economies of scope. In this context the rich experiences of EU-supported R&D partnerships in the framework of both research and regional policies are further reinforced through the flagship partnerships aiming at meeting societal challenges in the context of the Europe 2020 Strategy.

Regional policies have built partnerships in the past and we can see different types of such partnerships when studying different types of regions as they convert from traditional to knowledge-based economies. The transfer is slow, cumbersome and affects only part of the economy so it goes without saying that there is no magic wand although certain common elements of success are crystallising.

Overall good governance and the selection of appropriate targets is the starting point for good regional transformation policies. In this process of shifting from traditional to knowledge-based activities the selection of smart innovation sectors can be technology-driven (ICT, biotechnology, materials, nanotechnologies, energy and environmental technologies), based on non-technological innovation (design, social innovation, media) or a combination of both. Success stories exist in all areas. But the selection needs to be carefully adapted to local strengths rather than blindly following the most promising overall technologies, which may not be suited to local circumstances.

When strategies are in place all *actors need to be mobilised*. A few champions can act as leverage and play a pivotal role but eventually policy-makers, RTDI organisations and the business sector need to work together to ensure long-term success. The existence of strong universities or research centres in a region may be a starting point but it is the manufacturing sector that will eventually create added value. Large and small firms, spin-offs, gazelles or multinationals may be

a selected subset or a combination of actors that trigger change.

There is a build-up of dense, complex and adaptable *infrastructure of RTDI intermediaries* in all rapidly improving regions. Without this, the implementation of effective regional policies is impossible. But the opposite is not true: building up infrastructure does not *ipso facto* translate into successful smart innovation.

A range of *policy instruments* is available for regional authorities to choose from. However, choices need to be informed and adapted to local circumstances. Many regions demonstrate the ability to adopt variations of generally known measures that are functioning in a particularly effective way in their own context.

Building of partnerships and networks is a factor emerging from all policy papers and experiences. These partnerships range from small, temporary networks to mega-clusters and large consortia tackling social challenges. Partnership building can take place at all levels, within regions, interregionally and at the European level.

In addition, it is important to realise that there is a difference between convergence and competitiveness regions. The transformation is much harder for the former than for the latter. While for all of them strategies and selection are important, competitiveness regions need primarily restructuring and retraining, whereas convergence regions have to build up institutions and physical infrastructure as well as to face the challenge that in this process social adaptation may not respond as planned. In this case they will risk wasting investment and fall behind.

The purpose of this report is to present the debate and trends on research, technological development and innovation (RTDI) policy in the EU, and in particular how it will affect regional development models and policies.

Public intervention for RTDI has systematically increased in the last decades at national level initially, then at European level and more recently it has increasingly been the focus of regional and local development policies. Differences between and within European countries and regions are significant and the theoretical and practical recognition that RTDI is a driving force of development makes it important for all cities, regions and countries to consider how they can position themselves in the ever-accumulating technological change and corresponding supportive policies. The regional level is relevant but it is challenging to identify the merits and limitations of regional RTDI policies and see how they inter-relate with national and

European initiatives. The ultimate target of this report is to present and analyse the recent RTDI developments in the EU as seen from the viewpoint of the local and regional authorities (LRAs).

The report is based on the Innovation Union Communication¹ published in October 2010 and on empirical evidence. The first part of the report analyses the Innovation Partnerships. They constitute an integration and follow-up of a variety of EU instruments, implemented in the last decade and presenting rich material to study how such programmes affected the regional level in the past and what can be done better in the future. A proposed new governance structure is expected to improve the efficiency and impact of this new type of partnerships.

The second part of the report presents an inventory of different types of regions in the EU and how some of these regions succeeded in using RTDI as an engine of growth and regeneration of their manufacturing sector. The report finishes with conclusions and recommendations on the role of RTDI for regional development. In general, it is recommended to select appropriate priorities of clear advantages for the region; to ensure financial, human and management means in the medium to long term; to build small and large, local and interregional/national/European partnerships in important areas by identifying the opportunities offered by complementarities. Finally, policy-makers need to invest in *policy capabilities* and realise that changes will be slow and marginal, becoming visible only in the medium to long term.

¹ European Commission (2010a).

1. Innovation Partnerships

1.1 Introductory remarks

In the early post-war years, academic theory already justified policy intervention for increasing research. This idea has been strengthened over time and moved from simple basic research support to a whole spectrum of incentives for the supply of research results, then demand and, more recently, the cooperation of actors across the board. Networks, clusters and innovation systems or milieu, which exploit economies of scope, are seen as the best models of competition. Synergies between different actors leading to agglomeration economies are considered to be the best territorial response to globalisation and the economies of scale that drive it. *Open innovation* is used as a concept and a descriptive model to encompass this development. 'Open' refers to interactions by contrast to earlier models based on closed systems of self-reliance and 'secrecy'. This new model integrates earlier observations and analyses made on the emergence of innovation through collaborations and networking of different types of organisations, as opposed to innovation emerging from one isolated business enterprise, often on the initiative of the marketing or the RTD department.

At the European level, cooperation, coordination and joint activities in the area of research and technological development started slowly in 1974 and increased significantly since. The justification for intervention at the European level relies on the complementarities and synergies that can be achieved through joining forces of scarce resources (talent, intellectual property rights and new ideas) from different countries and regions within the EU. Policy provides for support to all types of agents cooperating with one another in order to exploit the potential of the internal market through their high-quality RTD activities, the opening up of public contracts, the definition of common standards and the removal of fiscal and legal obstacles to cooperation.

Moreover, the Community and Member States should coordinate their RTD activities in order to ensure consistency among them (Art. 181), while the Multiannual Framework Programme and the corresponding specific programmes should fix the rules and context for such cooperation. Cooperation is also provided for supplementary programmes involving only certain Member States. In addition, the Community may participate in RTD programmes undertaken jointly by several Member States (Art. 185) and set up joint undertakings for the efficient execution of Community RTD programmes (Art. 187). Cooperation and coordination are therefore enforced throughout the Community actions in the area of research and technological development.

In search of more effective ways to promote innovation and the knowledge economy, the European Commission is now proposing, as one tool of the Europe 2020 Strategy, *Innovation Partnerships*. The Council, the Parliament and Member States are invited to support the concept and help fine tune and implement it. The sections below analyse:

- past experience and how networking developed, with particular emphasis on what can we learn from the predecessors of the Innovation Partnerships;
- what is the meaning and expectations of the new approach to Innovation Partnerships;
- initial thoughts on how these partnerships have affected in the past and may affect in the future the development strategies of the different types of European regions.

1.2 Innovation Partnerships in the past

The idea of joining forces to achieve research results and exploit them commercially in a more rapid and efficient way is as old as the R&D policy in the EU. In respect of this legal framework, the competent units of the European Commission as well as the Parliament and the Council have introduced various policies and instruments to encourage and reinforce the whole spectrum of cooperative activities: from harmonisation and coordination to networking, partnering and clustering. These policies apply to both cross-border cooperation and cross-sectoral or cross-institutional interfaces. A brief description of RTDI partnership-building in the EU follows as a summary of lessons learned on how partnerships can be improved and how they can contribute to European welfare in the future. Three types of past interventions are outlined, which will continue in a similar form in the future: (i) supporting RTDI directly through the Directorates-General for Research and Enterprise; (ii) building up RTDI as an element of regional policies using the Structural Funds; and (iii) initiatives of the European Investment Bank (EIB).

1.2.1 European RTDI support and the European Research Area

EU research support aims to integrate all Community RTDI policies with a view to increasing added value and avoiding duplication of effort. Networking activities favouring partnerships in cooperation with the EU are mainly supported through the EU Framework Programme (FP) for Research, [COST](#) (European Cooperation in the field of Scientific and Technical Research) and [EUREKA](#), a European-supported network of 40 member states for market-

oriented, industrial RTD. More recently, partnership has focused on the harmonisation of national research policies in the context of the creation of the European Research Area (ERA). The concept of the *European Research Area* was introduced in the beginning of the 21st century to support better coordination and coherent development of the RTD policies of the EU Member States and their regions (ERAnet scheme). The *Open Method of Coordination* was introduced at the same time as a monitoring instrument to enhance the harmonisation of policies of the participating Member States. In this context, Article 185 of the Treaty providing for the research policy partnership of the EU and Member States (in variable geometry) became increasingly important.

The FP (currently the 7th) is the wealthiest instrument supporting partnerships. The largest component of the FP7 is the Cooperation Programme aiming to foster collaborative research across Europe in a large spectrum of 'thematic' areas (such as health, agro-food, ICT, nano and materials, energy, environment, transport, socioeconomic sciences and humanities, security and space). Besides the multi-actor research consortia financed under this Programme, other forms of networking are supported, such as the Joint Technology Initiatives, the ERANETs and the Risk-sharing Finance Facility. The other important component of the FP7 that demonstrates higher potential interest for regional governments and administrations is the Capacities Programme aiming to strengthen the knowledge, manufacturing and disseminating capacities of Europe, and to stimulate its research potential. Capacities are themselves composed of individual elements that also involve: strong partnering and networking among European actors in research infrastructures; regions of knowledge; research to benefit SMEs; research potential; science in society; and horizontal activities in the field of international cooperation. While the FP supports a very large number of partnerships, they are mostly small partnerships growing through a bottom-up process and hence less relevant for future lessons in the context of the new Strategy. However, some schemes, analysed in more detail below, may be seen as the predecessors of future partnerships:

- The *European Technology Platforms (ETPs)*² provide a framework for stakeholders (e.g. regulatory bodies at various geo-political levels, public authorities, business firms, research institutes and the academic community, the financial world and civil society), led by industry, to define research and development priorities, timeframes and action plans on strategically important issues. They also play a key role in ensuring the focus of research funding on areas with a high degree of industrial relevance and in fostering effective public-private partnerships (PPPs), while addressing the technological challenges that can potentially

² [European Technology Platforms](#)

contribute to a number of key policy objectives. An evaluation study of the ETPs³ concluded that industry and research organisations are well represented in the Platforms, but that end-users have reduced their presence despite the societal dimension of the concept. Stakeholders indicated that 'implementation' of the 'Strategic Research Agendas' (SRAs) has not been secured but substantial effects were obtained in coordination, expansion of networks and increase of communication possibilities; at the same time they estimated that there is a danger of duplication of effort due to the large number of ETPs. The study recommended that Commission establish the ETPs as 'European Flagships' that can positively contribute to the innovative potential of Europe.

- The *Joint Technology Initiatives*⁴ (JTI) are PPPs, user-driven actions under Art. 187 of the Treaty and based on findings of the European Technology Platforms⁵. In practice they are a means to implement the SRAs of a limited number of ETPs in which effective implementation requires a dedicated mechanism to achieve the objectives.
- One more European initiative based on collaboration and partnering is the *Lead Market Initiative* (LMI) launched during the FP7 programming period and aiming to exploit the possibilities offered by public procurement and standardisation for the promotion of innovation. A lead market is the market of a product or service in a given geographical area, where the diffusion process of an internationally successful innovation (technological or non-technological) first took off and is sustained and expanded through a wide range of different services. A 'lead market' is not necessarily the country or market where the innovation was first developed or even used for the first time. The LMI identified the following markets: eHealth, Protective textiles, Sustainable construction, Recycling, Bio-based products and Renewable energies (the areas identified could represent three million jobs and 300 billion EUR by 2020). The markets are highly innovative, provide responses to broader strategic, societal, environmental and economic challenges, have a strong technological and industrial base in Europe and depend on the creation of favourable conditions through public policy measures. For each market, a plan of actions for the next 3-5 years has been formulated.

³ IDEA Consult (2008).

⁴ JTIs currently exist in the following technologies: the Innovative Medicine Initiative (IMI), the 'Embedded Computing Systems (ARTEMIS)', the 'Aeronautics and Air Transport (Clean Sky)', the 'Nanoelectronics Technologies 2020 (ENIAC)', the 'Hydrogen and Fuel Cells Initiative (FCH)' and the 'Global Monitoring for Environment and Security (GMES)'.

⁵ Commission of the European Communities (2005); Commission of the European Communities (2007); [The Roadmap for Joint Technology Initiatives](#), 9 November 2006.

- The Competitiveness and Innovation Programme (CIP) includes the *Entrepreneurship and Innovation Programme (EIP)*, the *Information Communication Technologies Policy Support Programme (ICT-PSP)* focusing on developing a single European information space, and the *Intelligent Energy Europe Programme (IEE)* focusing on fostering energy efficiency and the rational use of energy sources, promoting new and renewable energy sources and energy diversification, of relatively small size and allowing much stronger involvement of regional and local actors in its implementation. The main funding schemes under the CIP⁶ are funding facilities, pilot and policy support measures (studies, data collection and publications, twinning and meetings of experts, awareness-raising, networking, benchmarking of national and regional performances and work on good practices).
- The *European Institute of Innovation and Technology (EIT)* operates the Knowledge and Innovation Communities (KICs), which consist of 4-6 'collocation centres' each - geographical sites where existing world-class partners interact and work together face-to-face.

In a more coherent approach the creation of the ERA also organises initiatives for enhanced partnerships. More recently, coordination in the context of the ERA includes trans-European partnering in Research Infrastructures⁷ (RI). This term refers to '*facilities, resources and related services used by the scientific community to conduct top-level research in their respective fields, ranging from social sciences to astronomy, genomics to nanotechnologies*'⁸.

Article 185 (former 169) provides a legal basis for the Community to support the integration of national research programmes by means of participation in RTD programmes undertaken by several Member States. The Community provides financial support for the joint implementation of national research programmes, based on a joint programme and the setting-up of a dedicated implementation structure.

Examples are 'European and Developing Countries Clinical Trials Partnership' (EDCTP) initiative, Eurostars and Ambient Assisted Living. One lesson learnt from the EDCTP is that this type of initiative can only be effective if integration between the national programmes involved operates at all three levels: scientific, management and financial. A clear, multi-annual commitment of the participating countries must be ensured in financial terms.

⁶ [EU Finance for small and medium - sized enterprises \(SMEs\)](#)

⁷ Examples of RIs are CERN, the European Mouse Mutant Archive (EMMA), the GÉANT high-speed network, the European Synchrotron Radiation Facility (ESRF)

⁸ European Commission, [Research & Innovation - Infrastructures](#)

1.2.2 RTDI as a component of EU regional policy

Structural Funds absorb one third of the EU budget and have increasingly shifted their focus into RTDI. While initially channelling funds almost exclusively to physical infrastructure and manufacturing investment, they gradually adopted the idea of the relevance of new technologies for regional development and since 2006 all regions eligible for ERDF support are expected to earmark funds for research and innovation. The RTDI policies of the Structural Funds as well as of most of the European regions address human resources, improving the effectiveness of organisational structures, creating strategic intelligence, strengthening networking, partnering and clusters. Interregional cooperation is increasingly proving to be a critical tool supporting technology transfer, developing economies of scope, benchmarking and other activities that are essential for post-industrial economies.

During the 2000-2006 programmatic period the Structural Funds invested about 10.5 billion EUR in research, technological development and innovation, 97% of which came from the European Regional Development Fund (ERDF) and most of which (70%) was spent in the Convergence (ex objective 1) regions⁹. Support for research and innovation fell into four types of activity: (i) research projects based in universities and research institutes received about 26% of total investment (2.7 billion EUR); (ii) research and innovation infrastructure, technology transfer centres and incubators received 25% (2.8 billion EUR); (iii) innovation and technology transfer and setting up networks and partnerships between businesses and/or research centres received about 37% (3.6 billion EUR); (iv) training for researchers received about 3% of the total (350 million EUR), through the European Social Fund (ESF). In addition, the ERDF supported about 180 innovative action programmes, which act as laboratories of ideas for disadvantaged regions.

In the new programming period 2007-13, about 15% (of the 308 billion EUR) of the Structural Funds will be concentrated on supporting innovation, sustainable development, better accessibility and training projects in the remaining regions under the 'regional competitiveness and employment' objective. Another 2.4% will be made available for cross-border, transnational and interregional cooperation under the 'European territorial cooperation' objective. For this, the Community strategic guidelines for cohesion policy indicate how to aim at improving knowledge and innovation for growth. They identify four priorities for investment, of which the first three envisage different types of partnerships:

⁹ European Commission Regional Policy, Regions for economic change, [Innovating through EU regional policy](#), 2006

- i. strengthening business-to-business (B2B) cooperation as well as between businesses and public research/higher education institutions, and supporting the creation of regional and trans-regional clusters of excellence;
- ii. supporting research and innovation activities in SMEs and enabling SMEs to access RTDI services in publicly-funded research institutions;
- iii. supporting regional cross-border and transnational initiatives aimed at strengthening research collaboration and capacity building in research priority areas;
- iv. strengthening RTD capacity building, including ICT, research infrastructure and human potential.

The Community strategic guidelines identified practical areas for facilitating innovation and promoting entrepreneurship:

- raise the efficiency of regional research, innovation and education supply and its accessibility to firms, in particular SMEs, by establishing poles of excellence or developing and creating regional clusters around large companies;
- enhance business support services to enable enterprises to increase competitiveness and to internationalise. B2B services should prioritise the exploitation of synergies (e.g. technology transfer, science parks, ICT communication centres, incubators and related services, cooperation with clusters) and give more traditional support in the areas of management, marketing, technical support, recruitment, and other professional and commercial services;
- improve the exploitation of European strengths in the area of eco-innovations through the introduction of environmental management systems;
- promote entrepreneurship, facilitating the creation and development of new firms and spin-out and spin-off companies from research institutions or firms.

These priorities are specific to two main types of assisted regions of the EU: *a. Convergence Regions*: RTD, innovation and entrepreneurship, including strengthening research capacities and their integration into the European research area; aid to RTD, notably in SMEs, and to technology transfer; improvement of links between SMEs, tertiary education, research institutions and research and technology centres; development of business networks; PPPs

and clusters; support for the provision of business and technology services to groups of SMEs; and fostering of entrepreneurship and innovation funding for SMEs through financial engineering instruments. b. *'Regional competitiveness and employment' Regions*: Innovation and the knowledge economy, through support for the creation and strengthening of efficient regional innovation systems capable of reducing the technology gap, and taking local needs into account.

Interregional partnerships are supported through the *'Regions for Economic Change'* initiative¹⁰ of the European Commission operating as a learning platform for EU regions and the *European Groupings for Territorial Cooperation* (EGTC)¹¹, which is a legal instrument created to facilitate and promote cross-border and interregional cooperation with the participation of Member States, regional and local authorities, associations and any other public body.

Under the *'European territorial cooperation'* objective and in the framework of cross-border, transnational and interregional programmes, the ERDF can support the creation and development of S&T networks, and the enhancement of regional RTD and innovation capacities. Actions may include: the establishment of networks between education and research institutions and SMEs; access to knowledge transfer between RTD facilities and international centres; twinning of technology transfer institutions; and development of joint financial engineering instruments directed at supporting RTD in SMEs.

The *European Social Fund* (ESF) can support projects that increase adaptability of workers, enterprises and entrepreneurs by promoting lifelong learning and increased investment in human resources, as well as the design and dissemination of innovative and more productive forms of work organisation. The ESF may also support investment in human capital, the implementation of reforms in education and training systems, participation in education and training throughout the life-cycle and the development of human potential in research and innovation.

Several evaluations and in-house appraisals suggest that the emphasis given to RTDI by the Structural Funds has promoted European cohesion and the transregional partnerships have, in several cases, helped neighbouring regions take advantage of larger markets with similar characteristics. Similarly, the recently created neighbourhood policy has used cluster policies to improve the international competitiveness of European regions. In an address to the

¹⁰ European Commission Regional Policy - Inforegio, [Regions for Economic Change. Exchanging good practice between Europe's regions](#)

¹¹ European Commission Regional Policy - Inforegio, [European Grouping for Territorial Cooperation \(EGTC\)](#)

Committee of the Regions, the competent Commissioner¹² noted that the Member States are clearly putting the emphasis on the promotion of clusters of activities promoting innovation, RTD, knowledge economy, entrepreneurship and the growth of innovative businesses. In its 5th Convergence Report¹³, the Commission notes that European growth sectors have largely contributed to convergence. However, important differences remain and the pattern of catching-up differs. The following 6th Convergence Report¹⁴ put particular emphasis on creativity and innovation stating the belief that these can help the EU to face the current economic crisis successfully.

1.2.3 European Investment Bank (EIB) instruments

Member States need to match EU funding and are sometimes (in the financial crisis period more than in the past) experiencing difficulty in increasing public spending. As a consequence the EIB is increasingly intervening to support RTDI initiatives, lending funds for research and innovation with state guarantees. The main instrument of the EIB for funding the development of the knowledge and innovation economy is the *European Investment Fund* (EIF). Most of the EIF's actions are implemented in cooperation with the DG Enterprise and Industry and with the Structural Funds, targeting direct impact on regional development.

Through selected financial intermediaries, the EIF offers SMEs a wide range of financing instruments via financial intermediation of commercial banks and other national financial organisations. Partnerships of special interest are created:

- The Joint European Resources *for Micro to Medium Enterprises* (JEREMIE), launched by DG REGIO, the EIB and the EIF to improve financing of SMEs in Europe, emphasises in particular technology transfer, start-ups, technology and innovation funds, and micro credit.
- The *lower mid-market activity of the EIF* covers growth, expansion and mid-market funds, offering access to equity finance to SMEs in their growth phase. The EIF participates at an early stage of the fundraising process to catalyse and attract other investors' interest and help the managers reach viable fund sizes.
- The *Mezzanine Facility for Growth* is invested in hybrid debt/equity funds

¹²Hübner D. (2007).

¹³ European Union, Regional Policy, [Growing Regions, growing Europe. Fifth progress report on economic and social cohesion](#), June 2008

¹⁴ Commission of the European Communities (2009).

with a view to acting as a catalyst in this market segment. Its purpose is to provide alternative financing to support shareholding reorganisation or expansion for more mature businesses and late stage or expansion technology companies.

- The EIF manages, among other structures, the *High Growth and Innovative SME Facility* (GIF) on behalf of the Competitiveness and Innovation Framework Programme (CIP), which funds the GIF with the aim of improving access to finance for the start-up and growth of SMEs. GIF 1 covers early stage investments in specialised venture capital funds such as early stage fund, funds operating regionally, funds focused on specific sectors, technologies or research and technical development, and funds linked to incubators, which in turn provide capital to SMEs. Co-investment in funds and investment vehicles promoted by business angels is also allowed. GIF 2 covers expansion stage investments in specialised risk capital funds, which in turn provide quasi-equity or equity for innovative SMEs with a high growth potential in their expansion phase avoiding buy-out or replacement capital for asset stripping.
- A joint FP7-EIB initiative is the *Risk-Sharing Finance Facility (RSFF)*, which aims to improve access to loans to RTD actors from the EIB for large European research actions to overcome market deficiencies and financing of riskier actions. Progressively, RSFF is offered in each of the Member States and FP7 Associated Countries in order to allow access for smaller projects and beneficiaries (like SMEs).

1.2.4 Some concluding remarks on past Innovation Partnerships

The different instruments described above show that the idea of EU Innovation Partnerships is as old as RTDI policy itself. The justification of acting at European level emerges from inter-Member State cooperation. A few conclusions from the past help position the current innovation partnerships in the context of future regional policies:

1. Partnering for RTDI in the past had both an actor (mainly research and business partners) and a territorial dimension (between Member States).
2. Partnerships became increasingly important over the years and new actors are increasingly incorporated in them, namely the public authorities (in the form of public procurement) and civil society (end users).
3. Most of the instruments supporting partnerships in the EU do not take the regional dimension into consideration. Having partners from more than

one Member State is the most frequent requirement for support.

4. Conversely, the Structural Funds focus on the creation of RTDI capabilities in the regions (depending on their status) but do not address interregional cooperation. Partnerships within the region are addressed by the emphasis of regional policies on clusters and innovation systems.
5. The only instruments that combine trans-regional cooperation are the Regions of Knowledge and a small share of the Structural Funds.

1.3 The new framework for 2020

The recent financial crisis and the continuous competitive pressures from emerging economies oblige the EU to adapt and reinforce its development strategy. The Strategy for the year 2020, accompanied by specific documents such as the one on the Innovation Union, reflect current policy thinking. Similar determination needs to be consolidated at the national and regional levels but also by the social partners.

The Commission published a Communication on a new Initiative¹⁵ that bears the qualification of a flagship and sets the strategic context for the new time horizon, 2020. The Innovation Europe Initiative expects to mobilise the active forces of the European Union around the goals of innovation, competitiveness and job creation. Innovation is recognised as the best means of successfully tackling major societal challenges, which are becoming urgent. Europe is not short of human potential of high quality, creativity and entrepreneurship. Nevertheless, Europe has to face the fragmentation of its creative forces, the underinvestment in knowledge production and dissemination, the high cost of protection of intellectual property, and ineffective standardisation and public procurement procedures.

The Commission proposes to develop a strategic approach to innovation; continue to invest in education, research, innovation and ICTs despite fiscal constraints; modernise universities and promote excellence; strengthen the innovation systems as well as the mobility of researchers and the movement of knowledge, creativity and design; enhance the links between science and businesses; simplify the rules for participation in the EU funding facilities, including the FPs, the ERDF and the EIB; introduce regional strategies for smart specialisation; facilitate the commercialisation of new ideas; improve the effectiveness of standardisation and public procurement in generating innovations as well as the effectiveness of international cooperation; boost

¹⁵ European Commission (2010b).

social innovation and innovation in the sector of public policies; and last but not least, reorient public entities' activities around the challenges. So many tasks to implement, each of them a necessary condition for success, but none of them sufficient alone. The potential implications of the Initiative require strong commitment from all sides in the long term.

The Commission also introduces a redefined partnership concept and launches the '*European Innovation Partnerships*' to respond to the need to pool expertise and resources in order to boost competitiveness and to stress the importance of direction as opposed to the rate of technical change and innovation. These partnerships will contribute to the acceleration of research, development and market deployment of innovation and to tackling important societal challenges, such as climate change, energy and resource scarcity, health and ageing. The identification of challenges and their detailed definition is a complex operation involving the social partners and civil society on the one hand, and the expert community on the other. It makes sense to select a challenge and mobilise forces around it not only if it is active/effective at the present time, but also if it is persistent and jeopardises the competitiveness of economies and/or the wellbeing of societies in the foreseeable future. Bearing in mind that devising solutions to new problems, based on science and on technological development, is a time-consuming activity, it is necessary to select challenges that require new knowledge and extend beyond current needs. Relevant strategic intelligence may propose emerging or latent challenges.

The demographic changes in the developed world have been considered a major challenge for Europe that may also become an opportunity for further development. Breakthroughs in this field are expected to occur in new treatments for life-threatening diseases and new solutions to improve the lives of older people. Moreover, improvement in quality of life may be brought about through healthy or high-quality foodstuffs using sustainable production methods and technologies for fast and secure information handling and sharing, communication and interfacing.

Similarly, climate change is considered to be a major challenge for the future of the planet and for the economies of all countries. A threat of this scope could be seen as an opportunity and not only encourage the development of new technologies but also create new markets and respond to latent societal needs. New knowledge can lead to: new ways to radically cut CO₂ emissions and other sources of pollution, particularly in cities; new alternative sources of energy and substitutes for increasingly scarce raw materials; solutions for reducing waste and landfill, improve the quality of water supply and achieve smart transport with less congestion.

Technological progress may contribute to increased competitiveness and bring European companies to the forefront of innovation and global leadership, opening up new public and private markets as well as new job opportunities. The funding of technological progress needs to be not only increased but also rationalised, by reducing fragmentation and duplication and increasing critical mass in selected priority areas. By merging efforts and resources, responses to the major challenges could be accelerated and new scientific, technical and organisational ideas could more easily find their place in the market.

The concept of the European Innovation Partnerships has been designed to respond to the needs for rationalisation in the use of scarce resources and for optimisation of organisational effectiveness, when the market fails to respond spontaneously and coordinated public intervention at the European, national and regional levels is required. These Partnerships will introduce a new approach to EU research and innovation policy to be tested in practice. The main characteristics of these partnerships, which, to a large extent, differentiate them from the traditional ones, are as follows:

- they *focus on societal challenges* shared by most EU countries and regions, while the JTIs focus mainly on technological perspectives (science push approach). They have clear and ambitious objectives and deliverables, within the 2020 horizon, with the potential to respond to people's needs and to open new markets or considerably grow existing ones. To be successful, they are expected to focus on results, outcomes and impact. The goals are analysed into work packages and tasks, each with specific objectives, phases and a corresponding time schedule, implementing team and budget. Stakeholders with converging interests monitor the individual work packages.
- they aim to *intervene on the whole innovation chain*, gathering the relevant stakeholders at all organisational levels, i.e. research and development, demonstration and pilot investment, regulation and standardisation, public procurement and other demand-driving activities. Activities that are performed independently in present initiatives should be planned and implemented in a PERT-type organisational setting in order to reduce the lead time from knowledge production to market penetration. In particular, the long-term commitment and mobilisation of the stakeholders is necessary for the objectives to be successfully pursued.
- they simplify and coordinate the existing instruments, tools and actions in order to increase their effectiveness and impact. Complementary elements can be added whenever necessary, as might be the case in the Lead Market Initiative, public procurement and the revision of regulation.

- they demonstrate a clear EU added value, which adds efficiency and economies of scope and scale. In this respect, the Commission has an active role to play.
- the strong commitment of the EU and the stakeholders is demonstrated by the allocation of the necessary financial resources to the individual projects and to the support structure. This last feature is of crucial importance for the successful implementation of the Innovation Partnerships since poor management and support structure can ruin the best ideas and plans. Management structure has to provide for monitoring and feedback to initial objectives, flexibility and adaptability, continuous arbitration between partners for conflicting or simply diverging targets. Decentralisation of decision-making in individual projects is necessary for efficient management of such complex actions, but coordination is even more necessary in order to avoid missing the main goals. A Steering Board should have the main responsibility for governing each Partnership.

A strong governing Steering Board chaired by the lead Commissioner (one or two, as required) and composed of a limited number of high-level representatives of the Parliament and the Council (Ministers and MPs), industrial, academic and research leaders is of critical importance for the successful implementation of the concept. Specific operational groups of interested stakeholders (knowledge producers and users) and an executive Secretariat supplied by the Commission will work in support of the Board. The Secretariat, under the guidance of the Board, will prepare the multi-annual strategic work plan of the Partnership with practical objectives, milestones and deliverables, allocated to the various partners, and will also monitor the progress of work and report to the Board, while the Commission will secure the necessary political support in cooperation with the Council and the Parliament, in particular for the adoption of new regulatory frameworks. In designing the implementation mechanism, the Board might need to break down the 'grand challenges' into sub-sets of challenges that will be manageable by partnerships of key actors and stakeholders with simpler governance structures.

Due to the novel element of this concept, the Commission is prepared to first introduce a pilot phase with the launch of one Partnership so as to test not only the concept as such and its acceptance by the European institutions and citizens, but also the governance, implementation and financing arrangements, the selection process and criteria and in particular its integration into the next Framework Programme for Research and Technological Development. The year 2011 will, therefore, be a year of experimentation and adjustment. The

Commission assumes responsibility for managing the process of launching and monitoring the activities to gather and assess information about successes and failures and making the necessary modifications to the initial orientations and planning.

1.4 Conclusions on the European Partnerships: the role of the regions

In order to achieve the goals of the 2020 Strategy, the Commission now urges the Member States and the regions to combine all possible sources of national and regional funding, and in particular the FP7, the CIP and the Structural Funds, while proposing to concentrate structural funding into a limited number of highly effective instruments, such as clusters, interregional cooperation, public procurement, and research fields, identified in relation to the regional strengths.

In the Commission's document, referring to the Structural Funds' role in Innovation Union¹⁶, provision is made for actions supporting smart growth through regional policy and its funding mechanisms. The ERDF is intended to support smart specialisation strategies elaborated by the regions through funding education, research and innovation, and even by redirecting actual funding programmes. The ERDF will also co-finance public procurement to increase the innovation content of products and services. Furthermore, it will consider financing short-listed FP7 and CIP projects and improving regional innovation policy, drawing on FP7, CIP and INTERREG platforms and networks. The interregional cooperation will promote research and innovation under the Convergence and Regional Competitiveness Objectives. The Commission itself will develop a Smart Specialisation Platform, as well as platforms for mutual learning on smart strategies. It will also enrich policy analysis in order to facilitate the elaboration and implementation of smart specialisation strategies at national and regional levels.

As the regions are taking on an increasingly important role and it is recognised that the regional level was not sufficiently taken into consideration in past RTDI policies, the new instruments discuss the roles of the regions more extensively.

The European regions would be interested in being involved in the implementation of this new policy instrument from the beginning, in order to best exploit the opportunities it may create. If they have to devise strategies for successfully facing the challenges of globalisation, they need to integrate into European-wide networks and participate in the process of international division

¹⁶ European Commission (2010c).

of labour. The globalisation process leads to the reinforcement of 'hot spots' and to further accumulation of knowledge in sites where there are already poles of knowledge-driven growth, expressed as emerging clusters based on smart specialisation. The accumulation process reinforces the circulation of skilled people (researchers among them) in the active regions, and the exploitation of knowledge generated elsewhere (the process known as open innovation). The sustainability of this process requires strong cooperation and linkages at European and global levels, which can be serviced by the Innovation Partnerships. The European regions should develop the necessary intelligence for assessing their strengths and weaknesses at interregional and global levels and seeking strategies for exploiting opportunities and combating threats.

Moreover, the European regions could benefit from the new forms of innovation, such as user-driven and social innovation that are integrated into the concept of the Innovation Partnerships. Social innovation addresses new solutions to societal problems and the new forms of social organisation needed to ensure their delivery. It involves new forms of organisation and interaction that respond to social demands for new and better ways of resolving societal problems and satisfying social needs.

Innovation in the service sector is increasingly recognised, which might be of particular interest to the European regions. This is usually non-technological innovation that substantially improves the productivity and quality of services both to businesses and to the citizen or final consumer.

The European regions and cities could seek stronger involvement in the process of identifying major challenges and defining the specific targets and deliverables in detail. Moreover, they could be involved in designing the implementation mechanisms, since this can strongly impact the potential participation of the regions in the initiative. The Commission has already provided for a Partnership in the field of 'smart cities' which is a challenge to create a vision of the European city of 2050 and beyond as attractive to high-level labour as to capital, for the economic advantages and the quality of life it may offer to its inhabitants. More challenges may be identified and described in detail in order to be discussed for potential adoption by the social partners.

Regions will also be involved in the process of assessment of the pilot implementation of the Innovation Partnerships, which will give them the opportunity to improve its fit to regional and local needs and potential. The preparation of the competent authorities for such a task seems rather urgent if it is to put in operation within one year.

This is going to become an additional challenge for the civil services and the

regional administrations of the coming decade, since the combination of the various funding sources requires relatively high levels of sophistication, strategic intelligence and flexible funding procedures.

2. Regional profiles and analysis¹⁷

2.1 Inventory of regions

Europe is made up of 287 regions, which in terms of size, population, wealth and productivity are not homogenous, but all have one thing in common: their welfare cannot be sustained unless they rely, for their future production, on high returns on investment deriving from innovation. Labour costs are too high¹⁸ and reducing them would deteriorate living conditions. But high labour costs do not have a negative correlation with welfare; on the contrary, prosperous regions are those with high wages and high productivity.¹⁹ So, European regions can only sustain and improve their prosperity in an open, global economy through productivity increases based on new knowledge. But, while both policy-makers and academics²⁰ agree on the need for a shift to the knowledge-based society, the road of change is anything but easy.

A large number of studies have been published in recent years identifying the trends for regions to converge or diverge in terms of GDP/capita and the means that helped them grow. In this context several typologies have been developed classifying regions by their:

- economic structure (distinguishing between developed regions, regions in decline and less favoured regions);
- connections to knowledge (distinguishing high-tech regions, metropolitan knowledge-intensive services regions, skilled technology regions, public knowledge centres, knowledge-absorbing regions, skilled industrial Eastern EU regions and traditional Southern regions);
- growth rates (distinguishing between regions forging ahead, stable and falling behind).

A number of regions that have actively pursued a development policy converting from traditional activities to the knowledge economy have been selected and presented in alphabetical order below (2.1.1 to 2.1.17). Not all Member States could be represented and not all of them are success cases, but they represent a broad spectrum responding to the different dimensions

¹⁷ The references for the compilation of the regional profiles mostly include web links; these references are provided in a separate CD-ROM.

¹⁸ European Commission (2009).

¹⁹ Fagerberg J., Verspagen B. (2001).

²⁰ European Commission (2010d); Aghion P., Durlauf S. (2005).

mentioned above. Most of these regions show a high growth pattern and as such they offer interesting lessons. Table 1 summarises their main features.

Table 1

Region/Country	Type of region	Traditional activities	Knowledge society targets/achievements	Features of particular interest
Alsace, France Rapid GDP and human resources growth	Skilled technology region	Steel, automotive	Biofuel, image, ICT and agro-food as cluster of excellence	Cooperation between traditional industries and emerging services lead to new added value chains, such as the cases of chemistry generating eco-conception, and of the car industry giving new solutions to mobility.
Bavaria, Germany Rapid GDP growth, spectacular conversion from a relatively poor region to one of the leading German regions within decades	High-tech region (emerging from traditional within few decades)	Agriculture, car industry, machinery	Modernising the automotive industry	Special emphasis on the support of networks and clusters. A recent impetus in this regard has been the 'Bavarian Cluster Campaign', which was started in 2006, as a successor to the major 'Initiative for Bavaria's future'. Hosting some of the major German multinationals.
Bratislava, Slovakia All relevant indicators have grown in the last decade	Skilled industrial region	Heavy industry, automotive	Horizontal emphasis on RTDI policy, design, ICT and software development	Attraction of FDI in ICT, creation of recent dense RTDI infrastructure financed by the Structural Funds.
Bremen, Germany Strong decline of shipbuilding and rapid regeneration	Skilled technology region	Shipbuilding, steel, automotive, food	Aerospace, design	Focused regional technology strategy and good implementation. The University of Bremen has played a crucial role in research and the development of one of the largest German technology parks. BIA and Bremerhaven are large and strong innovation agencies.
Catalonia, Spain Among the fastest growing regions in the Mediterranean	Knowledge-absorbing region	Food industry, automotive	Pharmaceuticals, ICT and horizontal R&D support	Strong central ministry; focus on supporting VC and private equity. Major actors are universities and research centres with private management. Complex, sophisticated infrastructure. The ACCIO Cluster development and the Avancsa New industry are interesting policy cases to study.

Region/Country	Type of region	Traditional activities	Knowledge society targets/achievements	Features of particular interest
Central Jutland, Denmark Leading wind energy, rich region forging ahead	High-tech region	Machinery, food industry	Energy and environment, healthcare	Limited regional competence in RTDI and the knowledge triangle. Reliance on world-leading companies in their area; significant role of the University with special foundation playing an important role. Special support to IT.
Hainaut, Belgium Urgent need for conversion, with moderate results	Knowledge-absorbing region	Wood, metallurgy, machinery	Health, ICT and materials	A regional 'Marshall Plan' to stimulate research. Dense infrastructure as well as good monitoring and improvement of governance structure.
Liguria, Italy Conversion based on old competencies with spectacular GDP growth	Skilled technology region	Shipbuilding, textile, agriculture	Electronics, petrochemicals and aerospace, high-tech shipbuilding	Very active Chamber; special emphasis on training; dense support infrastructure; promotion of local cluster: Liguria Produce Marine Consortium.
Manchester, UK One of the oldest industrial regions in Europe, which could overcome significant challenges within two decades	Metropolitan, knowledge-intensive services region	Typical industrial revolution structure with metallurgy, steel and automotive.	Media industry, computer games, large research facilities	Dense infrastructure and emphasis on collaborative structures. The Manchester Knowledge Capital plays an important coordinating role - this is a not-for-profit company, with members from the City Councils and universities of Manchester and Salford, chaired by the CEO of Manchester Science Parks Ltd. Good intermediaries achieving scale as actors merged recently into the Innovation Sub Group to form the Manchester Innovation Group.

Region/Country	Type of region	Traditional activities	Knowledge society targets/achievements	Features of particular interest
Noord Brabant, The Netherlands Conversion through the adoption of emphasis on non-technological innovation	Knowledge-absorbing region	Traditional industrial region: metal-working, machinery	High quality manufacturing and social innovation, sports, culture, creative design	The public sector is under-represented, while the pivotal role of Phillips is evident. The national and sub-regional (local) policy coordination has worked out well. The Brainport initiative is worth studying.
Oxfordshire, UK A unique example based on one actor, which mobilised the whole region	Public knowledge centre; high-tech region	Agriculture, automotive	ICT, bio, all high-tech	The role of the university is critical, but has only been effective in recent decades. The mid-1990s saw a rapid expansion of the high-tech economy, including university spin-offs. The Oxford Trust is an independent charitable foundation and a company limited by guarantee that seeks to encourage economic growth through innovation and technology transfer; the New and Renewable Energy Centre (Narec) represents a pioneering example of capacity building through economic renewal using infrastructure from defunct industries.
Rhone Alpes, France One of the motors of Europe through rapid adaptation	Skilled technology region	Metallurgy, metal-working, machinery, textile, agro-food	Emphasis on human resources, energy, transport and logistics, sport and leisure, services to firms	Multi-pole region, dense infrastructure, transfer of headquarters of multinationals, emphasis on gazelles (rapid growth firms in leading edge technologies) and currently hosting 11% of all French gazelles.
South Aegean, Greece Tourism dominated rapid development	Traditional Southern Region	Tourism, agriculture, fisheries	Energy, environment	An initiative of the University of North Aegean to create mobile, renewable energy desalination floating mills has faced regulatory and policy constraints and despite technological success could not achieve the necessary scale to support the region to convert into a really pioneering eco-region.

Region/Country	Type of region	Traditional activities	Knowledge society targets/achievements	Features of particular interest
Southwest Ireland One of the most dynamic Irish areas with spectacular GDP growth	Knowledge-absorbing region	Agriculture	Horizontal emphasis on R&D and education, business services, ICT, life sciences, financial services, chemicals and refineries	Policy is based on active regional actors, an increasingly dense network of intermediaries (technology centres and incubators), attraction of multinationals, and active regional partnerships.
Tuscany, Italy Transformation of the economy based mainly on increasing knowledge context in traditional industries	Skilled technology region	Textile, machinery, agro-food, tourism	Fashion industry based on design, pharmaceuticals	Strong regional structures; emphasis on the knowledge triangle. Special schemes of interest include supporting large firms for investing in research and innovation in cooperation with SMEs and two observatories, one for high-tech enterprises and one for innovative enterprises.
Western Finland Very rapid growth region with one of the highest research intensities	High-tech region	Traditional manufacturing	ICT, biotechnology, horizontal education and R&D	Strong public sector support. The Regional Council of Southwest has a 20-year Regional Plan and a Regional Programme that is reviewed every four years. The scale of the park with large companies and a large number of spinoffs is significant. Demola is a 'demo factory', a multidisciplinary open innovation environment where researchers and students can co-create new digital products and services with global market potential.
Western Sweden Very rapid growth with top, but reducing, R&D intensity	Skilled technology regions	Traditional industries, automotive	Biotech, health, energy, films. R&D-driven clusters, emphasis horizontally on entrepreneurship and innovative SMEs	Emphasis on entrepreneurship by young people and supporting companies. 'Mind Your Own Business' run two start-up offices located in two different towns and targeting all potential entrepreneurs through counselling that does not need to be booked in advance and connecting clients with advisory organisations, thus helping speed and scale.

2.1.1 Alsace

The Region has a proactive policy based on the strong presence of postgraduate education, the development of the Competitiveness Pole, responding to a national policy (future vehicle, biovalley and fibres), and clusters of excellence (image, ICT, agro-food, housing). Cooperation of traditional industries with emerging services lead to new added value chains, such as the cases of chemistry generating eco-conception and of the car industry giving new solutions to mobility. Such examples of transition form the basis of the Regional Strategy for Innovation. Priorities are the emergent sectors of green economy, health and humanism.

The regional innovation system is coordinated at the regional and the national level. The Strategic Steering Committee for Innovation validates the programmes, actions and means as well as evaluating the results; it is composed of representatives of various operators of the regional innovation system. The Evaluation and Orientation Committee for innovation is an advisory body, evaluating proposals, preparing recommendations and strategic initiatives, developing indicators and promoting innovations and dissemination. It is composed of experts and well-known people. The Bureau is steered by the Regional Agency for Innovation. A multitude of other organisations make up the landscape of the regional innovation system: the Regional Chamber for Trade and Industry; Centres of Innovation and Technology Transfer; an incubator; Conectus Alsace, which groups the commercialisation services of public research; the regional risk capital funds; the cluster promotion agencies; the Technological Resources Centres (agro-food, glass-ceramics, laser treatment of materials, organic fertilisers, metrology); the Cells of Technology Diffusion; the Carnot Institutes (assessing the capacity of research units to cooperate with business partners); the Imaging Resources Centre; the ORTECH Pole (high speed metal-working); ADEC (the Association for the Development of Firms and Competences); and the regional or national public organisations funding projects. Of particular importance in the system is the Mulhouse Technopole, in the southern part of the Region, providing for an integrated spectrum of support services to innovative firms and activities.

The multitude and diversity of measures and instruments is impressive. The Region demonstrates a high level of awareness of the challenges on the sustainability of its economic efforts. Weaknesses of the industrial fabric are faced with a large variety of measures and structures that are monitored, while a new organisational setting will systematically evaluate performance.

2.1.2 Bavaria

Bavaria's economy has undergone significant structural changes over the past 50 years, changing from a traditional agricultural region to become one of Europe's most competitive industrial regions, featuring an important and growing services sector. Important industry branches are the automotive industries (including supplier branches), electrical engineering and mechanical engineering. In addition, Bavaria is one of the leading international regions for high technology fields such as ICT and biotechnology.

There are large regional economic disparities within Bavaria. The major economic region is the area around Munich, with several global players in the automotive industry, ICT, media and publishing as well as the military industry. The backbone of Bavaria's outstanding RTDI performance is its diverse and multi-faceted institutional research landscape. Both the Max Planck Society's and the Fraunhofer Gesellschaft's headquarters are located in Munich. There are several clusters and research networks with an international reputation located in the region, e.g. in the automotive and aerospace industries, medical technology, and biotechnology.

The Bavarian government defines its regional innovation policy as a major element in the strengthening of the regional economy. The responsibility for regional RTDI policy in Bavaria lies with the regional government but for the implementation of RTDI policy instruments, several (semi-)public bodies have been established: e.g. 'Bayern Innovativ GmbH' is responsible for technology-transfer activities, 'Bayern Kapital GmbH' is responsible for venture capital financing, several technology and start-up centres are responsible for supporting entrepreneurial activities, and so on. Another important agency is the Bavarian Research Foundation, which supports innovative research projects and knowledge transfer activities.

There are currently several interconnected funding programmes with relevance to regional innovation policy. Special emphasis is placed on the support of networks and clusters. A recent impetus in this regard has been the 'Bavarian Cluster Campaign', which was started in 2006, as a successor to similar earlier major initiatives. The main objective of the cluster campaign is to promote the networking of and among Bavaria's SMEs. A success story is the bio-region in Regensburg, which has become one of Bavaria's fastest growing economic regions.

2.1.3 Bratislava

The Region of Bratislava has been the largest recipient of Foreign Direct Investment (FDI) of all the Slovak regions thanks to a highly skilled and educated workforce, offering high labour productivity and flexible labour market regulations. Investment opportunities are present in traditionally strong sectors like machinery and precision engineering, automotive, metallurgy and metal processing, electronics, chemistry, pharmacy and tourism, but also in RTD, design, technology centres, ICT and software development, where the city is home to major multinational companies. In recent years the region has focused on RTDI policy. EU accession and funding have been crucial in that respect.

The Slovak Investment and Trade Development Agency, operating under the authority of the national Ministry of the Economy, provides an effective framework for the support of foreign investors as well as export activities of Slovak enterprises. The regional innovation system is complemented by a network of education and research organisations, such as the Comenius University in Bratislava. This University is expected to become the Excellence Centre for Biotechnology and Biomedicine. The Slovak University of Technology is active in various research fields; an Institute of Engineering Studies and a Management Institute complement the system. Additional establishments of tertiary education were created in the last two decades to respond to the expanding needs for continued education. A modern infrastructure to support innovation and the building of the knowledge-driven economy has developed. There are three industrial parks; a University Technology Incubator; a Know-How Centre, which promotes the transfer of technical and other knowledge from the university to economic actors; a research and innovation network linking university laboratories with business; and a Science and Technology park.

2.1.4 Bremen

Bremen experienced a serious economic crisis in the '80s and '90s; further, the shipbuilding and steel industry have seen a deep structural change in recent years. Many large enterprises have not survived this process. However, the aerospace industry has changed and shapes Bremen today as a service and high-tech location. In the longer-term economic development since 2000, the state has maintained its rank in the upper third of the West German federal states. On the basis of the significance of the manufacturing sector, Bremen has been able to establish its position as an important manufacturing location with a main focus on car construction, aerospace, electrical engineering and the food industry. Thanks to the existence of the ports of Bremen/Bremerhaven, the

federal state of Bremen is Germany's second largest foreign trade location after Hamburg.

The most important organisations responsible for RTDI policy are the Senator for Economic Affairs and Ports (in the German city-state of Bremen, the equivalent of Ministry is Senator) as well as the Senator for Education and Science. Important organisations with regards to RTDI policy are the Agency for Economic Development and the Bremerhavener Society for Investment Support and City Development (BIS). These two organisations are responsible for nearly all innovation-related policy programmes in Bremen. The main sponsors of institutionally supported research in the higher education sector include the University of Bremen, the Hochschule Bremen and the Hochschule Bremerhaven (both universities of applied sciences) and Bremen's University of the Arts. The University of Bremen has developed one of the largest German technology parks in which today about 6 000 predominantly highly qualified people are employed. With a view to the transfer of research results into practical application, the universities of Bremen have developed their own instruments. A main characteristic of Bremen's research is the high degree of inter-linkages and cooperation between the universities and non-university research institutes and with the business sector, as well as a high degree of regional technology transfer, strong interdisciplinary, high third-party funding rates and systematic support for junior scientists with the aim of excellence and internationality.

Bremen's innovation campaign aims to position Bremen among Germany's ten leading technology areas by the year 2010 through a long-term innovation-policy. The effort is being structured, and the relevant Bremen policy areas coordinated, via six inter-sectoral lead topics: mobile solutions; e-logistics; innovation materials; ecological intelligence; the future health-services market; and maritime technologies (Bremerhaven).

2.1.5 Catalonia

The Catalonia Autonomous Region of Spain is one of the fastest growing regions of the European Mediterranean seaboard. Catalonia's economy is based on a long-standing industrial tradition. A highly supportive policy for venture capital (VC) and private equity and an active inward investment policy in high technology areas appear to be the most distinctive features of the region. The Institute for Catalan Finances is the most notable public source of venture capital, having a financial stake in about 14 venture capital funds. Foreign investors settled in the Region are active in the areas of transportation equipment, electronics, chemicals, pharmaceuticals, ICT, shared services centres as well as more traditional sectors like food.

The successive regional governments in recent decades have created a dense, rather complex and sophisticated structure of organisations promoting science and innovation under the leadership of the Ministry of Innovation, Universities and Enterprise. Under the Ministry, several agencies and publicly funded foundations implement the RTD and innovation policies. The Catalan government has sponsored the creation of approximately 40 independent research centres, based on a private management model with external scientific committees, talent recruitment and public structural funding. Two types of technology centre support the regional economy: Technology Centres and Technology Dissemination Centres. TECNIO, the Network of Technology Centres, brings together all the different centres under one entity. Moreover, there are 25 science and technology parks in Catalonia. The regional government also has a portfolio of programmes and schemes to promote research and to a lesser extent innovation and technology transfer. Of particular interest for the regional government is the development of clusters, which are promoted by ACCIO in various areas. The clusters function in conjunction with hubs that are promoted in similar or related economic areas. In Catalonia there are ten strategic competitive hubs, areas with exceptional benefits for business investment in different intensive knowledge and added value sectors that have a number of common features. The hubs are developing in Innovation and Creativity, Mobility and Logistics, Synchrotron and Advanced Technologies, Optics and Health, Agrofood Innovation, ICTs in Health and Wellness, Clean Materials and Technologies, Chemicals and Sustainable Energy, Functional Nutrition and Water and Food. Additional public support to entrepreneurship and technological development is provided by AVANÇSA, the Business and Industrial Location Promotion of Catalonia, SA, a public firm aiming to link 'new industry' to more traditional manufacturing and to services to businesses, through participation in 'projects of the future'.

2.1.6 Central Jutland

The Region is home to Vestas, the biggest manufacturer of wind turbines in the world, Grundfos, a manufacturer of pumps and other industrial equipment as well as leading companies in the food industry. Central Jutland is among the world's leading regions in energy and is investing heavily to remain so. A particularly interesting feature of the region is that it receives its income from the central government and the municipalities. The main areas of focus of the regional authorities are health care and social protection, education, coordination of regional development in environment, tourism and business development. Local initiatives and regional policies coordinate harmoniously with national priorities and funding, while the initiatives of all potential actors on the one hand create a positive climate for entrepreneurship and competitiveness while on the other hand they also offer fertile ground for

external funding.

In this way the Region benefits greatly from the various measures and funding implemented at national level. One example of the national measures with considerable impact at regional level is the clustering promoted by 'Invest in Denmark' in six focus areas: Life Sciences, ICT, Creative Denmark, Maritime Denmark, Cleantech. 'Invest in Denmark' is part of the Danish Trade Council, which supports a policy to encourage foreign high added value investment in the country.

Infrastructure is dense in the region. Higher Educational Institutions are crucial for maintaining a leading role in research. The Aarhus University, which receives significant research grants from the government, research councils and many Foundations, is active in front-end research. The region has a forward-looking policy diversifying into new areas of energy. An example is the Hydrogen Innovation & Research Centre, established as a network of research institutes and companies with the aim of fostering commercialisation of technical research in the field of hydrogen technologies in collaboration with universities, research institutes, educational establishments, public institutions and, in particular, the business community. Its main instrument is demonstration projects.

2.1.7 Hainaut

The economy of the Province is service-dominated (mainly trade and repair) while in the industrial sector the prevalent areas are construction, the food industry, metallurgy and metal-working, the chemical industry and non-electrical machinery and equipment. The Province is the largest exporter of the Walloon provinces, with chemicals, wood products, metallurgy and machinery ranking top of the list.

Innovation is promoted mainly at the regional and provincial levels. Decisions by the administrations of the two levels need to be complementary to avoid duplication. The University of Mons is a crucial player developing centres of excellence. The mobilising programmes of the Region focus on health, ICTs and materials. A 'Marshall Plan' launched by the regional government for the development of Competitiveness Poles also provides research grants. The National Research Fund and the European Framework Programme offer additional opportunities for research funding. Various provincial faculties have merged to establish the Provincial Haute Ecole of Hainaut-Condorcet specialising in health, technical and other disciplines. A Provincial Institute also provides training in traditional as well as most modern disciplines. The Science Park of Initialis in Mons focuses on broadcasting, life science and new materials

providing a series of facilities for firms and hosts subsidiaries of some of the major multinationals. Initialis cooperates with universities and colleges, hosts a network of research centres (electro-magnetism and telecommunications, new materials, materials for soil coverage and chemical technologies) and makes available to firms a Business Innovation Centre, a Technological Incubator and a Technological 'Business Accelerator'.

Hainaut Développement, the Development Agency for the Economy and the Environment, offers support services, advice and information on various matters to the enterprises of the Province. The Unit ReHGIS (Relay of Hainaut for Management and Strategic Information), created by the Chamber of Trade and Industry, aims at helping the local SMEs to manage information and improve the effectiveness of their decision-making. The multiplicity of organisations supplying services to businesses secures diversity and competition, but does not seem to follow an integrated plan for the Province or the Region to move to new technology-based economies. A great deal of effort is expended by local actors on a rather unformed strategy. Wallonia is striving to come out of the traditional manufacturing-based economy and has been overtaken in economic and technological performance by the rival northern region of Flanders.

2.1.8 Greater Manchester City

The City of Manchester and its surroundings are well known for their industrial past, which weighs heavily in current transformation efforts. Strategic priorities for 2020 address the issues of young people, including increasing the number of people with higher education qualifications, the highly skilled, in particular increasing the number of students in science, engineering, technology and mathematics, attracting talent through better infrastructure, increasing the number of knowledge workers, developing low carbon economic activities, and showcasing Manchester as an internationally recognised research and consultancy centre.

The vision of the regional authorities targets 'sustainable economic growth based on a more connected, talented and greener city, where prosperity is enjoyed by the many, not the few'. The Manchester city target is to become a world leading knowledge centre, drawing upon, among other things, the emerging demand for skilled jobs; the MediaCity UK, designed around the media industry from the TV-producing community to computer game designers; and investment in large research facilities such as the Synchrotron Radiation Source in the Daresbury Laboratory and the Manchester Science Parks. There are also several initiatives that are additional assets for the transition effort and are also supported by the Northwest Regional Development Agency (NWDA). These include the Corridor Manchester Partnership around the Oxford Road that

aims to attract hi-tech industries; the Cityco Partnership for the development of the City Centre; and the MIDAS inward investment agency for the global marketing of Manchester and supply of relocation support to firms.

Innovation initiatives are mushrooming although GERD/GDP is below the UK average. The Manchester Knowledge Capital (M.KC) is a not-for-profit company, with members of the City Councils and universities of Manchester and Salford, chaired by the CEO of Manchester Science Parks Ltd. The income from members, industry, NWDA, the Manchester Airports Group and from public grants for specific projects is used to support operations. The primary objectives are to 'guide the development and implementation of innovation across Greater Manchester, to continue to promote Manchester as a knowledge city and to increase the rate of innovation and knowledge-based activity to drive Manchester forward as a global innovation hub'. 'New Economy' provides economic intelligence to inform the development of policy to support Manchester's economy and create economic intelligence in partnership with local authorities and a range of public and private sector partners while it also offers research services into priority areas. M.KC and the New Economy recently merged into the Innovation Sub Group to form the Manchester Innovation Group that will oversee innovation strategy and policy for the city region and secure its implementation. The move is considered to be a reflection of the growing importance of innovation as part of the overarching Greater Manchester Strategy.

2.1.9 Liguria

For centuries this region has prospered through the steel and shipbuilding industries as well as its specialisation in agriculture and high quality and added value products such as flowers and wine. After the oil crisis, steel production gave way to higher technology products in shipbuilding, electrical engineering and electronics, petrochemicals, aerospace and agro-food. Services also developed at rates above the national average, thanks to tourism and the large port facilities. The textile industry is also very important with cotton, hemp and jute being the most commonly processed raw materials.

The improvement of human capital is the most visible feature of regional policy and the number of students in the second stage of tertiary education leading to research more than doubled between 2000 and 2008. In terms of governance, the most active actor seems to be the regional Chamber of Trade, Industry and Handicrafts, which supports the businesses (including the Service to New Enterprises), managing registries, managing and supplying information to local SMEs and participating in local training institutes (such as the Excellence Centre for Innovative Training and the distance learning university Universitas

Mercatorum). Financing the initial development of start-ups is possible using the available funds and guarantees of Invitalia, the Province (Impresapiu scheme) and the Region. Through the scheme Progetta!2 the Region helps SMEs to apply for funding from the EU research and innovation programmes, by subsidising the cost for the preparation of proposals. The TelemacoPay scheme allows access to data of regional and European registries, to patent and trademark applications and to request economic consultation.

The main educational establishment of the Region is the Genova University, operating a long series of research centres covering diverse areas of science from genomics and magnetic resonance to tourism and 'people-inspired technologies'. Excellence Centres focus on molecular mechanisms and on integrated logistics. Various bodies, functioning as associations, aim to support the promotion of technologies in enterprises, the Science Festival and the commercialisation of research results; entities in the form of consortia and foundations promote marine science, environmental chemistry, transport and logistics, neuroscience, oncology, information and communication science, data mining and so on. The S&T Park of Liguria, set up as a corporation, targets research training and technology transfer; four competence centres specialise in the areas of robotics, environment technologies, marine technologies and management of marine biological resources. A regional research and innovation centre was recently established to promote information on domestic and international programmes, collaboration between public and private institutions and to supply services aimed at stimulating corporate technological innovation processes. At the same time, the regional authorities introduced a three-year programme identifying strategic objectives and defining general guidelines for implementation. Among other initiatives, a small group of manufacturers established the 'Liguria Produce Marine Consortium' comprising approximately 18 companies specialised in the production of quality equipment and accessories for the boating industry.

2.1.10 Noord Brabant

The Brabant region is a leading area in technological but also non-technological innovation, i.e. social innovation, sustainability, sports, culture and creative design. North Brabant has traditionally been the most industrialised province in the Netherlands. It has successfully managed to move into the post-industrial era. The 'Brabant Agenda' is an official document that aims to contribute to the creation of an excellent environment for economic and social development and for a high quality of life. In Brabant, there is an alliance between knowledge-intensive businesses and high-quality manufacturing, which is often a continuation of the industrial activities of the past, while tradition and technology are combined in extremely effective ways.

Because of the strength in private R&D and innovative networking there is a large absorption capacity for policies that support this strength. Public R&D investments and related policies are under-represented in the policy mix in North Brabant. The provincial government of the region does not have a budget or competences to influence the R&D policy mix. A new national policy approach tries to better balance public-private R&D and coherence between the national and regional strategies and programmes. At the sub-national level in the Netherlands there is no science or public R&D policy or budget, and no generic policy instruments to increase private R&D. To a large extent the national government provides the R&D policy tools and at the regional level these tools are implemented and complemented with regional innovation strategies formulated by triple-helix structures.

Public and industrial research in Noord Brabant is clustered in different cities and their surroundings: high-tech systems (Eindhoven), automotive technology (Helmond), social innovation (Tilburg), agro-food (Hertogenbosch) and maintenance and logistics (Breda). The Provincial government and the cities are coordinating their innovation policies to transform the knowledge base into business opportunities by creating science-industry interfaces, open innovation environments and clusters with SMEs. A main multi-cluster area of high technology has developed around the city of Eindhoven and Philips activities; it is known under the name of Brainport. Brainport is home to multinational companies and knowledge and research institutions, creating technology that ensures a 'secure, green and caring society'.

In the western part of Breda, surrounded by smaller towns and bearing the brand name of 'Gateway to Europe' is a regional service centre. Breda is developing coherent concepts in the network of infrastructure and business activity. A third pole of development operates around the city of Tilburg, a textile centre in the past and now making available a dedicated team of consultants to provide advice and assistance to new entrepreneurs and established businesses (Starters Advice Team). The City also has a dedicated 'acquisitions team' to advise companies considering relocation to Tilburg from elsewhere.

2.1.11 Oxfordshire

The county is better known worldwide for its old university. The experience of Oxfordshire is probably not replicable but can offer useful lessons on the development of knowledge-driven economies because the economy transformed from traditional to high-tech in a short period of time. Oxfordshire's high-tech economy has grown thanks to the university. But while the university was always there it was not until the '90s that the economy really transformed. The

first spin-off firm from Oxford University was established in 1946. In the 1960s the dominant sector was the automotive industry. By the late 1970s, employment in the automotive sector had fallen and the high-tech economy began to contribute to the changing industrial structure of the economy. Growth in the number of start-ups was slow until the mid-1980s. Between 1979 and 1986, employment in high-tech manufacturing fell less sharply and output increased rapidly. The Oxfordshire high-tech cluster has been services dominated. The mid-1990s saw a rapid expansion of the high-tech economy, including university spin-offs. New SMEs have played a major role in driving the cluster. The cluster began to grow rapidly from the mid 1990s. More recent data shows that growth of entrepreneurship in the Oxfordshire economy continues to accelerate.

Oxfordshire has one of the largest concentrations of research facilities in Europe and 4% of all research and development employment for England. The Harwell Science and Innovation Campus has become a world-class centre for science, innovation and enterprise. The Oxfordshire Community Partnership brings together Oxfordshire organisations from the public, private, voluntary and community sectors to focus their efforts on those fields that are important to people living, working and visiting the county. The HUB was founded as a response to the needs of the individual entrepreneur to conceive new ideas and develop them into businesses. The Oxford Trust is an independent charitable foundation and a company limited by guarantee that seeks to encourage economic growth through innovation and technology transfer. The New and Renewable Energy Centre (Narec) represents a pioneering example of capacity-building through economic renewal using infrastructure from defunct industries - wind turbines require heavy shore-based development, manufacturing and support facilities. The Chamber of Commerce group of the County offers to its members, through Thames Valley, a network of nine local chambers and a team of local business managers, a series of services to help develop small firms.

2.1.12 Rhone-Alpes

The Region was named one of the four Motors of Europe for its dynamism and rate of adaptation to the new global context. The industrial fabric of the Region is quite diversified, composed of both traditional and modern industries: metallurgy, metal-working, non-electrical machinery, chemicals, plastics, energy, textile and technical textile, transport and logistics, tourism, sports and leisure; but is also active in agriculture and agro-food, the car industry, electrical and electronic equipment, clothing, printing and home appliances. In an effort to diversify into knowledge-based industries, 200 000 people are employed in the health industries, pharmaceuticals, biotechnology ICTs, the environmental industries and electronic components.

During the last decade, the human resources in science and technology increased to 42% of the economically active population and students in tertiary education to 58% of the population aged 20-24 years. The Lyons and Grenoble poles and the proximity to Swiss Geneva, as well as the presence of a large number of foreign firms, are all important elements of success. In the service sector, the largest employer is the 'services to firms' (300 000 employees), which gives the Region the characteristics of a modern knowledge-intensive economy. This is intensified by the research sector, particularly of the business sector, both in large multinationals and in smaller firms. In the last decade, a number of multinational firms transferred their headquarters from various places in France to Rhone-Alpes. Rhone-Alpes is now home to 11% of the national total of fast growing small firms.

The Region of Rhone-Alpes introduced two types of clusters: the 'Rhone-Alpes Clusters', aiming at developing key industries in the Region that integrate jobs and increase the attractiveness of the area to investors; and the 'Research Clusters' grouping the scientific community, through networking laboratories and teams to implement a joint multidisciplinary programme for the production of new knowledge of interest for regional development.

2.1.13 South Aegean

The region is an island complex incorporating 79 islands, that are dispersed and far from the regional capital and administrative centre. The services sector dominates the regional economy and tourism is the most important sector. The Region is a marginal contributor to the National Innovation System of Greece and almost all research activities in the region take place within the Higher Educational Institutes, namely in the departments of the University of the Aegean based on the biggest islands.

Policy-making is the responsibility of the Secretary General of the Region and the Regional Council. RTDI policy in the region is designed and implemented only through the Regional Operational Programmes, that is through co-funding by EU Structural Funds. Plans have been made for modern instruments like the creation of clusters and support for the creation of technology-based firms funded by VC, as well as the funding of incubators and the establishment of an innovation pole within the region. Regional authorities aim to develop collaborative networks in which regional firms and research organisations will participate, linked to international and national value chains that will be used as leverage for increasing innovation.

Taking the structure of the manufacturing sector into consideration, it is clear that the development of the knowledge-driven economy will be difficult. One

exception is alternative energies, thanks to the sun and wind in the area. One very interesting case is worth presenting: mobile alternative energy-based desalination. On a special floating platform a wind turbine and photovoltaic systems produce and supply, through advanced electrical and electronic energy conversion components, energy to a desalination unit, which uses a reverse osmosis technique, in order to produce drinkable water from the sea. No chemical additives are used in the desalination process. The platform is designed in such a way that it remains stable even with adverse weather conditions (has so far faced winds up to 120km/hour, without any problem). Installation can be far from the coast (in deep water) avoiding any ecological impact or any stress to the environment as well as the opening of new roads that is required for land-based wind parks; it can be transferred to other places if needed. However, although the plant is technically operational and a spin-off from the university was created (the case features as best practice in several sites) it is neither commercially operational on the initial pilot island of Irakleia (regulatory inadequacies for the supply of the municipality are mentioned as the main reason) nor has it been replicated elsewhere.

This case indicates that for the conversion of regions lagging behind, the restructuring process faces not only financial and technical but primarily institutional and cultural barriers.

2.1.14 South West of Ireland

Within the region, the Greater Cork Area is one of the most dynamic areas of the country, in terms of education, research and development, internationally traded services (business services, software, financial and back-office functions) and high-tech manufacturing (chemicals, refineries). The region is the European headquarters for many multinational corporations in the electronics, software, food, pharmaceutical, bio-pharma and associated sectors. The Forfás Regional Competitiveness Agenda has identified that the region has strong potential for further development of the Life Sciences Sector, which includes strong regional sectors such as pharma; biomedical devices and functional foods; tourism; ICTs (hardware and services); internationally traded services; maritime; and energy/green technologies. There are also significant technology-based opportunities for the Region to embrace in the ICTs sector.

The regional and local authorities work towards preparing and making available the appropriate space for multinational investors, improving traffic and accessibility, enhancing the environment and raising the quality of life, to increase the attractiveness of the Region. Innovation and entrepreneurship are becoming important issues in regional planning. One University and two large Institutes of Technology, a Maritime College and a Research Centre contribute

to the regional labour market with a high level of graduates, research and facilities for experimentation. A Regional Innovation Cluster has been established by the South West Regional Authority to develop stronger and more active links between research, industry and State, regional and local development agencies. Campus companies involve one or more staff members, and possibly students, of the University and have access to the University's facilities, such as space and equipment, and to the University's expertise and IP.

Hands-on practical training programmes and the purpose-built incubation centre, the Rubicon, which opened an extension in 2010, have coincided with the success of entrepreneurial activity, at undergraduate level, where Cork Institute of Technology (CIT) students feature in the top five of the Enterprise Ireland Student Enterprise Awards over the last five years.

The Regional Council, in its multiannual plan for economic development, targets the strengthening of industrial development by integrating the products of the new industries into the production of the mature ones and by further developing these new industries. In an effort to diversify into knowledge-based sectors, the Region further strengthens the eight agglomerations of university facilities, several dozen tertiary-level technological and commercial schools, a plethora of vocational and continuous training establishments, and centres for technical services. The Region hosts several research centres of national and European importance. Nine European networks of excellence are coordinated by a regional project leader. The Chambers of Trade and Industry play an important role in the implementation of the regional policies. Financial tools address innovative firms that start with a project of strategic importance. Selected companies are also supported by the advisor network during their first years of operation.

2.1.15 Tuscany

Tuscany is a wealthy region specialising in the textile/fashion industry. Other manufacturing activities include chemicals/pharmaceuticals, metal-working and steel, glass and ceramics, clothing and printing/publishing sectors. The machine industry is also important. Innovation is to a large extent of the non-technological type and helps the major cluster to constantly assimilate new knowledge. Of particular importance is training into trades, such as fashion, that constitute the core of the economy. Various 'Fashion and Design' schools and studios act as intermediaries.

The regional authorities identified technological weakness (measured in R&D expenditure and patents) as a major problem and designed a priority axis targeting entrepreneurship, industrial research, quality promotion, innovation

and technology transfer, and accessibility to appropriate funding (guarantee funds, equity funds). Emphasis is placed on networking between research and business entities, technology transfer to firms through inter-firm cooperation (strategic alliances) and research organisations. Large firms may gain financial support to invest in research and innovation in cooperation with SMEs.

While all the traditional actors for technology transfer are in place (three major universities, incubators) special forms of governance, which are of particular interest, are one observatory for high-tech enterprises, one for the innovative enterprises and a working group on 'Innovation and industrial districts' that coordinates the initiatives of the System of Regional Chambers on issues related to innovation and supports the preparation of programmes on enhancing innovation and technology transfer.

2.1.16 Western Finland

The Regional Council of Southwest has a 20-year Regional Plan and a Regional Programme that is reviewed every four years, and grants Regional Development funds. The University of Turku, the Turku School of Economics and the University of Applied Sciences (polytechnic) make up the landscape of tertiary education in the city. A Project and Innovation Services unit in the University of Turku supports research eligible for funding and provides guidance for applying for funding supplied by national and European funding bodies. A Science Park in Turku hosts over 300 companies from the fields of biotechnology and information technology, including Nokia and Fujitsu, as well as several institutions of higher learning that work with the business sector. This cooperative element is seen as a particularly important factor for the city's future economic development, as outlined in the 'Turku Strategy' that is published annually by the city council. The Turku Science Park Ltd manages the Park and has the City of Turku as a main shareholder.

2.1.17 Western Sweden

The County Administrative Boards are responsible, among other things, for the implementation of national objectives, the establishment of regional objectives and the development of their county. Västra Götaland development was based on transportation and industry but in recent decades has worked in developing entrepreneurship by young people, supporting innovation and financing new companies. The present strategy is based on three pillars: Entrepreneurship, Innovative SMEs and RTD-driven clusters, while the existing traditional industry continues to compete successfully in the global environment. It combines relevance and excellence, targeting key areas that have been identified as strong drivers for growth and development in the region, as well as the

nation. The Region strengthens and develops areas such as biomedicine and health, vehicles, energy, films and the counselling sector, supporting high international standards of higher education, cooperation between universities, colleges and companies, the development of incubators and technology parks, the creation of new enterprises by seed financing, cluster development and industrial development. In particular, efforts are made to start up and develop more technology and knowledge-based growth companies that operate in an international market.

A large number of regional organisations are partly or wholly publicly funded to offer free support to start-up firms: counselling, funding and services to entrepreneurs and start-up owners with a non-Swedish background.

2.2 R&D as facilitator of transition

Looking at the development models of the regions above the only conclusion that can be drawn is that models, success features and policies differ significantly. There is no one-size-fits-all model and emphasis in terms of background, sectors specialisation, type of actors and instruments vary. There are, however, a few enabling elements that are either common or treated in a similar way in a number of regions and which, if not properly addressed, may become inhibiting rather than enabling factors. They include the regional background, which may or may not offer a basis for applying new knowledge to existing manufacturing industries, the type of actors that may or may not take initiatives and cooperate for the benefit of the region, the role of RTDI infrastructure and the overall strategy and policy design. These elements are discussed individually below.

2.2.1 The relevance of the regional background

Although the common element of the policies studied is the effort to renew their specialisation and become more competitive in knowledge-based activities, their background differs considerably.

- *Restructuring from declining to growth sectors.* Many of the regions presented already had a significant manufacturing background in sectors once delivering high returns but in decline since the oil crisis. As a consequence they had a dense and often high-quality physical (transport and telecommunications networks) and soft (human capital and innovation culture) infrastructure. These are either regions with declining per capita GDP in the '80s (such as Alsace, Bremen and Manchester) or they realised in time that restructuring was imperative if they were to maintain their prosperity (such as Catalonia, Rhone Alpes and Central

Jutland). The common element of regional policies in this case is intervention to help *retrain the labour force* (horizontal support to education, life-long learning and research figure as priorities in Tuscany, Liguria and Rhone Alpes) and often take strategic decisions on selected clusters/sectors to be promoted (as in Southern Ireland and Western Finland) through new dedicated *R&D and innovation infrastructure and incentives for business R&D and innovation*.

- *Restructuring from traditional sectors to the knowledge-based economy*. Many European regions have never experienced high income and specialisation in manufacturing. For them (such as South Aegean, Bratislava and Southwest Ireland) the conversion policy is much more challenging, as they need to build up a physical infrastructure, human capital and an entrepreneurial mindset to comply with the new competitive environment. Over and above the human *capital and incentives* necessary in the restructuring regions, in this case significant *private investment incentives are imperative* and *policy-making itself needs to adapt* by adopting a policy design/monitoring/evaluation sequence and feedback.

2.2.2 Governance: pioneering actors and regional alliances

Independently of the type of region, the selected experiences show that informed and energetic actors are the drivers behind real change. All European regions have a similar governance structure in place, but while in theory all regional policies/actors address the need to convert to a knowledge society, the difficulties of transformation need persistence and long-term commitment and management. Ideally of course, all relevant actors join together into a formal or informal alliance in the form of partnerships, as indicated in the new Europe 2020 Strategy or cluster formation. But we can still see that in individual regions, certain actors assume a proactive function and play a pivotal role: they inspire others and encourage the formation of alliances as well as triggering generalised change. Such actors are typically:

- *Politicians and policy-makers*. They are the natural leaders for transformation. In Catalonia the strong ministry is considered to be the major driver of change, while in Nord Brabant the national and sub-regional policy cooperation is delivering promising results. The relevant role of this type of actor focuses on the way they design and implement policies.
- *Different forms of business unions or even individual firms*. They can play a leading role and kick-start a process of change. The case of Phillips in Nord Brabant, the large automotive companies in Bavaria and Vestas in

Central Jutland demonstrate that world-leading companies, which modernise and export themselves, are demanding clients for local suppliers, who are obliged to innovate to comply with the needs of the global market. Chambers and business unions are often more prominent players than individual firms, in particular in regions where there are no major companies dominating the economy, as the cases of Liguria and Alsace suggest. While this is a private initiative, policy-making can be proactive by trying to create alliances with individual business firms and industrial federations or Chambers to inspire them or support them to play an active role. Firms learn best from other firms and hence they are more receptive to messages coming from their unions or their peers.

- *Universities and research centres.* They are another potential driving force in regional R&D and innovation policies. Again it can be individual universities that are fundamental in the R&D intensity and image of the regions, as in the case of Oxfordshire and Central Jutland. Even less famous universities can grow and play a very important role in the regional transformation process as in the case of Bremen, where a rather young university plays an increasingly important role, and the University of Mons, which is a major actor for the Hainaut region. Similarly in Catalonia research centres with private management could leverage change in their specific fields. In more traditional regions they can play a leading role in small fields only, as in the case of biotech in Bratislava and renewable energy/water desalination in South Aegean. In terms of policy-making, however, the creation, support and funding of universities and research centres may not be as effective as in the success cases suggested above. Universities and research centres need to adopt the model of research universities linked to the needs of the local society and avoid limiting themselves to teaching and basic research duties, in which case they cannot play an enabling role for regional transformation.
- *Other ad hoc actors like foundations* (as in the case of the Oxford Trust) can play a similar role as a key enabling factor. Foundations play an important role within the Aarhus University in Central Jutland. As with private actors, policy-makers can do little in this case and their only direct involvement is limited to attracting and facilitating the creation of similar foundations.
- *The alliance of all actors is the best recipe for success.* The Manchester Knowledge Capital is a formal way of organising an alliance of local actors, whereas the alliances in the French regions studied are more informal but sometimes equally effective. Even smaller specific alliances can trigger synergies and subsequent benefits as in the case of TECNIO

in Barcelona.

2.2.3 Density and effectiveness of R&D&I infrastructure

The density and effectiveness of research infrastructure is a common element in many of the regions studied. Tuscany, Liguria, Catalonia, Alsace, Rhone Alpes, Manchester, Bavaria and Western Sweden have a dense network of universities, research centres, incubators, science parks, innovation agencies and other dedicated intermediaries to support both incumbents and newly established companies. Among the traditionally less strong regions, South West Ireland could develop an active technology centre and incubator network. For regions with a strong background this comes as a natural development, while for traditional regions this may present more challenges such as the creation and maintenance of universities and research centres; unless the infrastructure of intermediaries becomes effective in their role of serving the private sector, their enabling role is lost and public funds are wasted. The effort to complement and enrich regional R&D&I infrastructure should thus be pursued with certain important guidelines in mind:

- *The role of scale:* intermediaries that are too small risk being ineffective as they cannot make available the necessary skills and equipment to respond to the business needs. If the clientele to be served is not large enough (or is not expected to grow to be large enough) interregional cooperation should be envisaged.
- The role of *effectiveness and monitoring:* individual organisations tend to pursue their own agendas (an agency problem) and forget their initial mission. In traditional regions supported by the Structural Funds, evaluations²¹ identify in some cases limited value for the region. Permanent monitoring is crucial and corrective action (dismantling or restructuring organisations) may be needed to ensure effectiveness of intermediaries. Networking intermediaries, as in the case of Manchester, is a helpful instrument in this direction.

2.2.4 Policy: strategy, implementation and instruments

Last but not least, policy-making itself is the most important element of success. An effective policy cycle of strategy design, effective implementation through the adoption of appropriate instruments, and monitoring for feedback and corrective action are indispensable elements for transformation. In this context

²¹ Technopolis Belgium, in association with Ismeri Europa, Lacave, Allemand & Associés Consultants, Logotech and MERIT (2006).

the following items need to be taken into consideration:

- *Strategy design.* Converting regional manufacturing capabilities to become knowledge-intensive opens up a large variety of choice. While the engines of growth are well known to be ICT, biotechnology, materials/nanotechnologies and energy/environment, not all regions can envisage developing in these same sectors, particularly in terms of new knowledge developments. Regions with a strong manufacturing and research background can convert part of their activities into such new areas: the New and Renewable Energy Centre in Central Jutland; the aerospace focus in Bremen; eco-conception in Alsace; the Life-Sciences Cluster in Western Ireland; and the ACCIO in Catalonia are such initiatives. In other cases the knowledge-based economy develops into more specialised clusters and partnerships based on natural advantages and path dependencies, such as the bottom-up created cluster of the Liguria Produce Marine Consortium or services to firms in Rhone Alpes. Specialised sectors like the Media industry appear to be a promising area for Manchester, logistics for Rhone Alpes and non-technological knowledge sectors such as social innovation, sports, culture and creative design in Noord Brabant.

What is absolutely crucial for the strategic decisions is the relevance of time: conversion policies are medium- to long-term and their expectations (and monitoring indicators) need to comply with this limitation. Transformation can only take place with private investments and they need time to comply and respond. The Regional Council of Southwest in Finland has demonstrated a successful strategy in that respect with a 20-year Regional Plan and a Regional Programme that is reviewed every four years.

- *Implementation* relates to the adoption and effective execution of specific measures supported by regional, national or European funds. The general schemes are well known: financial incentives in the form of grants and tax allowances²², training and placement incentives, and support for the creation of the necessary infrastructure mentioned above. Support to venture capital is considered to be particularly effective since it combines public and private benefits (the case of Catalonia indicates effective VC support) but as there is not a restrictive list or a one-policy-fits-all, certain initiatives go beyond the usual schemes. Some worth mentioning and found in the regional cases presented above include: (i) the two observatories for high-tech and innovative enterprises in Tuscany, as well

²² A large variety of measures can be found in the Erawatch, PRO INNO and Regional Innovation Monitor databases.

as schemes supporting large firms for investing in research and innovation in cooperation with SMEs in the same region; (ii) the Initiative for Bavaria's future; (iii) Demola in Western Finland, which is a 'demo factory', a multidisciplinary open innovation environment where researchers and students can co-create new digital products and services with global market potential; (iv) the Brainport model in Nord Brabant; and (v) Avancsa New Industry in Catalonia.

Another dimension of policy design is the type of businesses policy-makers are trying to attract in the context of regional transformation: multinationals are a good but difficult solution as many regions strive to attract them. Bratislava, Rhone Alpes and Southwest Ireland are models in that respect. But at the same time, the idea of promoting gazelles (rapid growth firms in leading edge technologies) is another interesting example from the French regions and Rhone Alpes in particular, as well as financing new companies in Western Sweden. As with multinationals, supporting gazelles is a very demanding task, since they are difficult to identify *ex ante*. Strong coaching and constant monitoring are necessary but there is always the risk of making *mistakes in picking winners*.

- Finally, policy can never be effective without an explicit *monitoring and evaluation* system, which has access to the necessary resources to be effective. Without a permanent and systematic basis of evidence, policy mix design and redesign is impossible. Because of the medium- to long-term conversion horizon, this is a *sine qua non* condition, which is unfortunately neglected by many regions, because they either do not have access to the means to put it in place or they fear that long-term and short-term targets may prove to deviate from the main goal.

2.3 Conclusions and recommendations

The above considerations can be summarised in a few conclusions:

- (i) Changing from traditional to knowledge-based activities is a long-term and challenging process, which is often announced but seldom rapidly achieved. It was not possible to identify any real catalytic effects that turn traditional regions into high-tech regions within short periods of time.
- (ii) The transformation cannot take place without significant funding, committed and competent actors and their alliances and well-designed policies embedded in an effective policy cycle.
- (iii) The conversion is easier for regions that already have a manufacturing basis, as restructuring implies a combination of upgrading the technologies for existing specialisation and of diversification into new technologies. Conversion is more difficult for regions with only traditional activities where human and physical capitals as well as policy skills need to be newly developed.
- (iv) There are no generic policy recipes or solutions but certain features are common and represent alternative paths towards change.

Recommendations in that respect include:

- (i) Adopt and share, with all local actors, a long-term but flexible strategy on which innovative/knowledge-based activities are most appropriate for the region. Linking the new activities to the existing basis is necessary in order to activate the business sector, which is the sole source of added value. But at the same time, finding new areas for longer-term specialisation is important. It is, however, clear from the examples studied that the new areas, where spin-offs and gazelles are expected to make a difference, are not necessarily technology-based - the knowledge-based society applies to non-technological innovation as well.
- (ii) ICT, energy and environment are sectors where regions with limited prior experience can specialise more easily than in biotechnology and nanotechnologies, where links to existing sectors are more difficult to obtain.
- (iii) Whatever the selection, it should be clear that the new sectors will go slowly and will, for a long period of time, be a small share of the overall economy. Clustering them with other sectors and linking human capital

policies with the targeted sectors are the main ingredients of success.

- (iv) Finding actors that can play a pivotal role in order to kick-start a changing process is another strong recommendation. If all actors are not willing or mature enough to form an alliance, individual actors can start the process until others follow, as long as they are influential and persistent.
- (v) In the same spirit, organising inter-regional cooperation and exploiting funding and support opportunities from a higher level (national, EU) is important to achieve the necessary scale to ensure effective exploitation of resources.
- (vi) Similarly, finding the appropriate policy instruments is important. Ideas for and models of policy instruments, both generic and specialised, are abundant. Organising a permanent learning and local adaptation process is part of good regional policy.
- (vii) Organising the appropriate dense and complex research infrastructure is also a sine qua non condition. But at the same time, the infrastructure can be ineffective if not suitably managed. Funding authorities (regional or other) need to organise an efficient monitoring and evaluation mechanism to help constantly improve and adapt the infrastructure to new challenges.

3. Overall recommendations for partnerships at the core of regional RTDI policies

Working in partnerships is increasingly seen as the best way to reap benefits from RTDI policy interventions, because partnerships increase added value through synergies, externalities and minimisation of overlaps. For decades, networks have been promoted in the EU, and experiences and evaluations have taught policy-makers a series of lessons that are taken into consideration in the most recent Europe 2020 Strategy. These lessons lead to several recommendations at the regional level. Certain recommendations are common to all types of regions:

- strategy and a systematic respect of policy cycles constitute the most important ingredient for the successful transformation of a regional economy;
- there are no magic wands targeting economic conversion. On the contrary, it is a long-term, cumbersome and costly process, where all partners need to be involved and play their role. Throughout this process the building up of a dense, complex, effective and adaptable infrastructure is the cornerstone;
- policy instruments need to increasingly focus on different forms of partnership, ranging from small, bottom-up emerging networks to large top-down, all-inclusive partnerships to meet common societal challenges;
- European support schemes exist and are increasingly available through R&D, innovation and regional support. Identifying suitable opportunities in the new framework early enough and organising regional participation will maximise the benefits;
- in all cases, the role of scale should not be neglected: intermediaries, policy incentives and the region itself should create alliances to form economically reasonable structures. If this is not feasible within one region, partnerships need to extend beyond.

However, as regions differ significantly, policy suggestions also differ.

The Competitiveness and Employment Objective applies to better-off regions with an existing infrastructure. They are easier to convert into knowledge-based

specialisation. Human and financial resources are more easily available and strategic approaches are easier to adopt. For these regions the identification of knowledge-based priorities is crucial, and in this process they should bear in mind both that their priorities should ideally be linked to existing capabilities and that knowledge-economy priorities are not only technology-based. The service sector also offers interesting opportunities in this context.

For regions classified under the Convergence Objective, additional challenges exist because the lack of industrial routines may cancel out the benefits of interventions leading to R&D support. In this context regional authorities need to be vigilant and avoid support schemes that will end up in idle capacities. This can be done with highly professional policy monitoring and the political will to transform the economy at the same time as informal behavioural rules.

4. Annex

4.1 Glossary

Objective One regions are ([NUTS 2](#)) with GDP per capita below 75% of the EU average; areas with very low populations such as much of [Sweden](#) and [Finland](#) also qualify for objective one status. Objective one was used in the 2000-2006 Programming Period.

Objective Two regions are at a smaller level than those with objective one status, with [NUTS](#) level 3 being used. They are regions where unemployment is higher than the EU average, a higher percentage of jobs are in the industrial sector than the EU average and industrial employment must be declining. Rural areas qualify for objective two status if the area has a low population density (less than 100 people per km²) or if the agricultural employment rate is double that of the EU average. The region must also have either a higher unemployment rate than the EU average or be facing a declining population. Areas dependent on the [fishing industry](#) will also qualify if it is in decline in that area. Objective two was used in the 2000-2006 Programming Period.

Objective Three aims to support the modernisation of education, training and employment policies and systems. Funds to achieve this objective are available to all EU regions except those eligible for Objective 1 funding. Objective three was used in the 2000-2006 Programming Period

Competitiveness Regions: All regions which are not covered by the Convergence objective or by the transitional assistance (NUTS 1 or NUTS 2 regions depending on the Member States) are eligible for funding under the competitiveness and employment objective. This term is used in the 2007-2013 Programming Period.

Convergence Regions: Regions at level 2 of the NUTS classification whose GDP per inhabitant is less than 75% of the Community average are eligible for funding under the Convergence objective. This term is used in the 2007-2013 Programming Period.

4.2 Acronyms

ADEC	Association for the Development of Firms and Competences
BIS	Bremerhavener Society for Investment Support and City Development
B2B	Business to business
CCI	Chambers of Trade and Industry
CIP	Competitiveness and Innovation Programme
COST	European Cooperation in the field of Scientific and Technical Research
DG Regio	Directorate-General for Regional Policy
EDCTP	European and Developing Countries Clinical Trials Partnership
EGTC	European Groupings for Territorial Co-operation
EIB	European Investment Bank
EIF	European Investment Fund
EIP	Entrepreneurship and Innovation Programme
EIT	European Institute of Innovation and Technology
ERA	European Research Area
ERDF	European Regional Development Fund
ESF	European Social Fund
ETPs	European Technology Platforms
FP	Framework Programme
GIF	High Growth and Innovative SME Facility
ICT-PSP	Information Communication Technologies Policy Support Programme
ICT	Information Communication Technologies
IEE	Intelligent Energy Europe Programme
JEREMIE	Joint European Resources for Micro to medium Enterprises
JTI	Joint Technology Initiatives
KICs	Knowledge and Innovation Communities
LMI	Lead Market Initiative
LRAs	Local and Regional Authorities
NWDA	Northwest Regional Development Agency
RI	Research Infrastructures
RTD	Research and Technological Development
RTDI	Research, Technological Development and Innovation
SMEs	small and medium-sized enterprises
SRA	Strategic Research Agendas
SWRA	South West Regional Authority

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