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Regionalisation of research and innovation policies in Europe

Under the Contract on Evaluation of the Norwegian Regional Research Funds

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List of abbreviations

ERDF	European Regional Development Fund
HEIs	Higher education institutions
NUTS	Nomenclature of Units for Territorial Statistics (standard code for referencing the subdivisions of countries for statistical purposes. It subdivides each Member State into three levels: NUTs level 1,2 and 3)]
RDI	Research & Development and Innovation
RIM	Regional Innovation Monitor
RTDI	Research, technology, development and innovation
STI	Science, Technology and Innovation
SF	Structural Funds

1. Introduction

1.1 Objective and context of the report

This paper analyses the trends in regionalisation of research and innovation policies in Europe and takes stock of the experience and practices in governance and delivery mechanisms of policy support measures at the regional level. It does so with the objective to draw lessons applicable to stakeholders involved in the funding scheme 'Regional Research Funds' in Norway.

The Norwegian Regional Research Funds was created in 2010 with the aim to stimulate research and innovation at regional level in seven regional funding areas. To implement the programme, seven regional funding areas have obtained own funds jointly managed by the respective regional councils. The annual budget of the scheme is around NOK 210–220 million that represents less than one per cent of the total national research budget.

This funding scheme represents an important development in Norwegian policy on regional research and innovation, since decisions on funding of research activities will be made at a regional level, which may open up for new R&D activities. Regional councils have become responsible for managing research funding and got a role as research policy actors.

The scheme builds upon previously established programmes such as BU 2000, VS 2010, BRO, MOBI or VRI that developed a broad perspective on regional innovation systems with an emphasis on interactive learning processes.

1.2 Method and sources

This paper is based on desk research and on on-going work being undertaken by the European Regional Innovation Monitor (RIM) (<http://www.rim-europa.eu>) and of ERAWATCH/INNO Policy TrendChart (<http://erawatch.jrc.ec.europa.eu>).

RIM is an initiative of the European Commission's Directorate General for Enterprise and Industry, which has the objective to describe and analyse innovation policy trends across EU regions. RIM covers EU-20 Member States: Austria, Belgium, Bulgaria, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, the Netherlands, Poland, Portugal, Romania, Slovakia, Spain, Sweden and the United Kingdom.

ERAWATCH and INNO Policy TrendChart offer a unique policy monitoring and benchmarking service on the full range of research and innovation policies in the EU and beyond.

The paper analyses lessons for the Norwegian regional partnerships at two levels:

- It synthesises of trends in the regionalisation of research and innovation policy and the implications this has for the interactions between national and regional policy governance based on a review of academic and policy literature.
- Lessons are drawn from specific regional cases of research and innovation policy governance and policy based on the RIM database and ERAWATCH/TrendChart reports.

In this respect, the paper first summarises the state of play of regional research and innovation policies and their most recent trends in terms of devolution; it presents recent examples of organising multi-level governance at the meeting points of national and regional policies and discusses the practices in creating a network among the actors in the regional innovation system. It brings then examples of delivery and funding mechanisms and thematic scope and finally it lists the key challenges of regional research policies.

2. Recent trends in regional research and innovation policies

2.1 Degree of autonomy

The scope for regional authorities to intervene in favour of science, technology and innovation varies markedly across countries and should be kept in mind when assessing lessons for Norwegian regions. OECD countries can be classified by the degree of decentralisation of powers/budgets for implementing research and innovation policy (Figure 1). The level of powers shifted to regional levels can mean a significant control and resources of science, technology and innovation (STI) policies such as in the case of several federal countries (Germany, Austria, Belgium) or where an elected regional authority exists such as in Italy or Spain. It can mean some decentralisation such as in the case of France, the Netherlands, Norway or Poland, where both regional authorities play an important role in the design and implementation of research, development and innovation (RDI) programmes thus they have an ownership of their research programmes. Respectively, it occurs that the regional/local level has no or very limited power in research and innovation such as in Slovakia, Hungary or Portugal.

Figure 1 Degree of devolution in RDI policy competencies

Degree of devolution in STI policy competences and resources		Federal countries	Countries with elected regional authorities	Countries with non elected regional level / decentralised State agencies
Significant control of STI powers and/or resources by regions		Austria, Belgium, Germany, Australia, Canada, Switzerland, United States, Brazil	Italy, Spain UK (Scotland, Wales, Northern Ireland)	
Some decentralisation of STI powers and/or resources to regions		Mexico	France, Netherlands, Poland, Sweden (pilot regions), Denmark (autonomous regions), Norway	UK (English regions), Sweden (except pilot regions), Korea
No decentralisation of STI powers	Regional innovation strategies		Denmark, Portugal (autonomous regions), Slovak Republic, Turkey, Czech Republic	Hungary, Ireland, Portugal (mainland)
	Innovation Projects only		Chile, Japan	Greece, Finland, Luxembourg, Iceland, New Zealand, Slovenia

Source: OECD, 2011

At the same time, such classifications tend to over-simplify the way to which policies are de-centralised ‘operationally’ and the policy mechanisms through which effective control over the priorities and investments of research and innovation policy may actually be exerted. According to Charles et al. (2004) the key roles of regional innovation governance are setting the regional priorities for research and innovation, coordinating with central actors in shaping policies and building linkages among research and innovation actors in the region.

As outlined in the 2010 Regional Innovation Monitor (RIM) annual report (Walendowski et al, 2011), governance capacity reflects the ability to both devise strategies and implement support measures. According to the assessment of RIM, four basic conditions are required for effective regional policy governance:

- Regional governance capacities in a narrow sense:
 - Sufficient legislative/regulatory autonomy
 - Sufficient budgetary autonomy
- Regional governance capacities in a broader sense:
 - Sufficient human resources to design and implement policy
 - Sufficient competences and experience to do so effectively
- Good relations with policy makers at the other levels with which interaction is planned.

- A relevant basis of regional stakeholders as addressees of the envisaged policy support.

In general, there are two aligning forces of regional and innovation policies: on the one hand top-down approaches, where the central government plays a key role and on the other hand bottom-up approaches, where regional autonomy is high. Howells (2005) associated the former with best practice methods and the latter as encouraging policies of a more bespoke nature. He lists the advantages of the two approaches as in Figure 2.

Figure 2 Advantages and disadvantages of top-down ‘best practice’ approaches and bottom up ‘bespoke’ approaches

‘Best practice’ vs. ‘bespoke’ policy mechanisms in regional innovation	
Advantages	Disadvantages
<i>‘Best practice’ policy mechanisms</i>	
Proven elsewhere	Common design, may be difficult to adapt to local circumstances
Acknowledged as the ‘best’	‘Best’ in what, or for whom?
May have been developed over considerable length of time in different circumstances	Locality may not have all prerequisite resources, institutions or mechanisms
Ready to use	May take time to adapt
May have ‘knowledgeable’ agency willing to help provide advice and support	May be difficult to understand; may have a large tacit element associated with implementation
Not developed by indigenous ‘clique’ that knows best	May face NIH syndrome
<i>‘Bespoke’ policy mechanisms</i>	
Developed for the specific locality	At the outset the policy is unproven, as it is unique and has not been applied elsewhere
Tailored for policy resources and ‘time-frame’	May take considerable length of time to develop and test
Encourages local coalition-building and development of expertise	May aggravate local tensions; local resources and expertise may be limited
Can be novel	Generally higher risk
Agency(ies) developing the policy can gain wider experiences through ‘learning-by-doing’	Agency(ies) developing the policy may become inward looking and unwilling to learn from elsewhere

Source: Howells, 2005

Regions have appeared as focal points for learning and knowledge creation since the 1990s, as the understanding grew seeing the regional social capital as the driving force behind economic growth (Cook, 1992; Florida, 1995; Storper, 1997). A system or network view of innovation policies became dominant (Landabaso, 1997) that prevails today as well. There are several reasons supporting a regional approach towards research and innovation policies. The importance of RDI actions at regional level is supported by the facts that approx. 65% of a country’s public investment is with regional/local authorities (OECD, 2011). Similarly, a large portion of public procurement that can be used to promote innovation happens at the sub-national level (EC, 2011). European Structural Funds and the popularity of cluster policies in OECD countries push as well in the direction of more regionalisation. The latest legislative proposal on Cohesion Policy (EC, 2011) states that in more developed and transition regions, at least 80 % of the European Regional Development Fund (ERDF) should be allocated to innovation, energy efficiency and renewables and SME support.

Howells (2005) raised though important questions that has to be asked before designing regional RDI policies: “Are the innovative spatial growth processes ‘natural’? By disturbing these natural processes do we necessarily damage the wider national economic good?”.

2.2 Most recent developments towards decentralisation

The regional dimension of innovation and research policies today is widely recognised and efforts towards its devolution are slowly continuing where more emphasis is put on regional policy making instead of a centralised approach. As a recent OECD study (2010) showed, countries report an increasing share in the total research and innovation expenditure allocated by regions. On the other hand it has to be also noted that with regard to the principles of governance applied at the regional level the survey of RIM (2010) found that bottom-up and decentralised approaches are quite rare and followed by hardly a tenth of all European regions. In this respect, the path of

regionalisation is very diverse and different types of devolution processes and solutions for multi-level governance exist.

Screening the most recent developments (2009-2011) in regional and national innovation policies shows a trend towards further devolution in the EU and other OECD countries, although the picture varies country by country. Figure 3 summarises the latest developments in this regard:

Figure 3 Trends of devolution in RDI policies

Degree of devolution	Countries, OECD report 2011	Most recent trends (2011)
Significant control of STI powers/ and resources by regions -	Austria, Belgium, Germany, Australia, Canada, Italy, Spain, UK (Scotland, Wales)	Austria, Germany, Belgium, Italy - No substantial change in the level of devolution, remaining strongly autonomous
Some decentralisation of STI powers	UK, Mexico, France, Netherlands, Poland, Sweden, Norway	+ Poland: increasing role is planned to be given to self-government bodies in innovation policies + Netherlands: national funding for regional development and innovation was stopped. Regions are faced with a reduction of budget but more responsibilities. - England: regional development agencies to be replaced by Local Enterprise Partnerships with reduced budget and power + Norway: regional councils receiving power to administrate Regional Research Funds Sweden: responsibility for innovation is to a large extent decentralised to the regional level
No decentralisation power/ RIS	Denmark, Portugal, Slovakia, Hungary, Ireland, Bulgaria	+ Bulgaria: potentially increasing role + Portugal: trends show towards more regionalisation - Hungary: role of regional level in development and innovation decreased, regional development councils stopped - Ireland: concerns of renationalisation + Slovakia: role of regional authorities in innovation slightly increases
No decentralisation power/innovation projects	Chile, Japan, Greece, Finland, Luxemburg, Slovenia	+ Greece: increasing role Finland: regional actors have marginal role, there is concern of the Ministry of Education and Culture decreasing the number of Universities of Applied Sciences. + Japan

Source: Own assessment further developing the OECD 2011 table based on RIM and TrendChart reports (“+” indicating a shift towards regionalisation of R&D policies, “-“ indicating that responsibilities for R&D are taken back to national level)

As we can see from the above table, in a number of European countries the power of regions in RDI policies is stable in general such as in Germany, Austria, Belgium, Sweden or Spain. In other countries there is a slow shift towards more regional power in RDI policies such as in Italy, Netherlands, Greece, Poland, Slovakia. Examples can be also observed where there is a trend towards centralised approaches such as England, Ireland or Hungary.

In Germany and France for instance there is **no substantial change** in the degree of autonomy of regional innovation and research policies. Nevertheless, in German regions (Länder) a consolidation of programmes and support measures is ongoing with a reshuffling of the governance system and regional support organisations, furthermore they tend to lay emphasis on thematic priorities and science-industry linkages (RIM German reports, 2011). In France, regional research and innovation

policies increased in their importance during the past two decades with a growing power given to regional authorities in terms of economic development.

In several countries a slow move **towards devolution of research and innovation policy** is apparent. In Greece, for instance, the reform of Kallikratis (2011) gives an increased autonomy to the regions in designing and implementing their regional development strategies and an increased role in the area of RTDI is also expected. In Poland the recent National Strategy for Regional Development (2010) has envisaged more power for the self-government bodies and to the Ministry of Regional Development, which reflects a shift from a top-down approach towards a multi-level governance model (Walendowski, 2011). Similarly, in Bulgaria the National Reform Programme for 2011-2015 plans to strengthen the role of regional development councils. In Japan the regional cluster programmes, such as the Knowledge Cluster Initiative and the Industrial Cluster Initiative provide an increasing role to regional authorities in innovation and research. In the Netherlands the national government stated that it would withdraw national funding for regional development and innovation policies in 2011, which means that regions will be confronted with a reduction of their budget for regional development, but as a result will have increased autonomy and power in decision-taking.

There are a number of countries where trends **towards renationalisation of research and innovation policy** can be observed. In Ireland public budget deficits resulted in a trend towards centralist approaches and there is a concern of a renationalised regional policy and diminishing regional governance (RIM, 2011). In Hungary the role of regional development agencies in funding of regional innovation strategies has decreased and the future of regional innovation agencies is uncertain. In England the introduction of the new Local Enterprise Partnerships has resulted in a reduced budget and powers compared to the old regional development agency system. Similarly, research and innovation policy in Finland is centralised and regional actors have marginal power in decision-making. There is a concern that with a decrease the number of universities of applied sciences proposed by the Ministry of Education and Culture even less leeway would remain for supporting tailored regional research and innovation.

While in Italy, regional authorities have wide autonomy in designing and implementing RDI policy, this is in not all cases **matched by an adequate autonomy in terms of fund raising** and financing of policy initiatives such as in Puglia. Another recent development is that the national government has blocked the central Fund for Underdeveloped Areas and is rethinking with a new programmatic document national funding allocation and priorities for economic development in Southern Italy (RIM report on Puglia, 2011).

To sum up, the **increasing relevance of exploiting territorial strengths push towards bolstered regional level effort** in innovation policy along with the growing emphasis put on cross-border development and on defining functional regions. However, it is also observed that the acute **need to increase productivity and effectiveness favours in certain cases new centralist solutions** in RTDI policy delivery mechanisms (as a response to the current economic and financial crisis).

2.3 Organising multi-level governance

The Regional Innovation Monitor Annual Report 2010 argued that there is strong evidence that the national level remains an important player in designing and implementing regional RTDI policy, alongside regional actors, thus multi-level governance and coordination is an important aspect of innovation systems. Multi-level

governance refers to a coordinated action by the Member States, regional and local authorities and the European Union based on partnership and aimed at drawing up and implementing policies. It reflects that responsibility is shared between the different tiers of government concerned and is underpinned by all sources of democratic legitimacy and the representative nature of the different players involved. (The Committee of the Regions, 2009)

The RIM report also points out that while the dynamic landscape of multi-level governance is shaped by multiple strategies developed by regions, governance capacities are not yet sufficient. In about two thirds of the regions surveyed the regional RDI governance cannot yet be assessed as effective. This reflects that there is still need on the one hand for better adapting regional interventions into specific regional contexts and on the other hand for raising the professionalism of administrative structures and human resources.

Perry and May (2007) distinguished four regional dimensions in R&D policies depending on the passive or active role of regional actors. According to the typology regions can be

- Stages, where regions are seen as appropriate scales of action or stages where policy is enacted, though regional units are not participants;
- Implementors, where regional authorities and agencies have a role in the implementation of nationally-defined policy initiatives and delivering centrally conceived priorities;
- Partners, where regional bodies have a role in shaping and delivering R&D&I agendas; and
- Independent policy-makers, where regional authorities act autonomously in agenda-setting.

Figure 4 Regional innovation governance typology

	Regional dimension in R&D&I policy	
Passive	<p>Regions as stages</p> <p>Ireland: national research&development and innovation measures implemented at regional level</p>	<p>Regions as implementors</p> <p>England: Local Enterprise Partnerships Finland: ELY-Centres</p>
Active	<p>Regions as partners</p> <p>Denmark: regional Growth Forums Poland: establishing territorial partnership contracts Norway:</p>	<p>Regions as independent policy makers</p> <p>Germany: vertical coordination at programme level</p>

Source: Adapted from Perry and May's (2007) original typology to structure current examples

Following the above outlined typology, country and regional cases are presented below in order to highlight the most recent developments (2011) in multi-level governance and coordinating among the different levels.

Regions as stages

Ireland: In Ireland regional research and innovation policy follows a centralised, top-down approach. Regional RDI is provided through a number of **national measures implemented at regional level** such as the Competence Centre programme or the

RTI R&D Fund that are designed and managed by national authorities such as Enterprise Ireland, the Higher Education Authority and Science Foundation Ireland.

Regional assemblies comprised of elected representatives and were established in 1999 by the Irish Government to give effect to the division of the country into two regions to comply the implementation of Structural Funds interventions. They have a role of a more policy advocate than policy-maker in research and innovation. For instance, during the preparation of the national strategic reference framework and operational programmes, the regional assemblies were consulted building on the Irish social partnership process (Kilcommons, 2011).

Regions as implementors

Finland: In Finland, the government decision on Finland's regional development goals sets the general guidelines for regional innovation policy. The establishment of regional ELY Centres¹ - **Centres for Economic Development, Transport and the Environment** - in 2010 represents a recent reform of regional administration in Finland. The centres were designed with the aim to foster regional development by implementing government actions at regional level. The centres are to collaborate with the regional councils while realising measures to promote entrepreneurship, labour market, and competence development among others. They are also responsible for regional foresight activities and participate in many local and regional planning processes. At the regional level RDI policy is jointly designed by the regional councils and ELY Centres.

The Centre of Expertise Programme for instance is a key part of the national RDI policy. The general objectives of this programme are set at the national level, but the actual regional objectives and measures are designed and implemented in the regional centres of expertise. Regional Centres of Expertise are responsible for initiating a range of innovation activities, in which research is combined with technological, design and business competence. They also participate in horizontal coordination of sector specific innovation policies by their involvement in national competence clusters. National competence clusters are network organisations in the National Centre of Expertise Programme, which comprises four to seven regional centres of expertise in the same sector around the country. In this way each regional centre is also networked nationally improving horizontal co-ordination and division of labour (Viljaama, 2011).

England: In England several recent changes were initiated in terms of multi-level governance: The Technology Strategy Board will provide the core funding and oversight of a series of new, national Technology and Innovation Centres. A national network of delivery agents will oversee the implementation of the ERDF under the auspices of the Department for Communities and Local Government. Regional development agencies are being replaced by **Local Enterprise Partnerships (LEP)**².

LEPs were designed to cover functional regions than administrative ones. As it seems the government intends to become more involved in supporting the LEPs, which operate on a reduced budget and have reduced powers compared to the old system (RIM, 2011). Motives behind the LEPs are to put more emphasis on private sector investment and enterprise and recognise that places have specific geographic, historic, environmental and economic circumstances that help to determine the prospects for growth. Regarding business innovation, the Technology Strategy Board will be the main delivery body, including the establishment of an elite **network of Technology and Innovation Centres**, following the example of the German Fraunhofer Institutes (BIS, 2010). The UK government had approved 31 Local Enterprise

¹ www.ely-keskus.fi

² <http://www.bis.gov.uk/policies/economic-development/leps>

Partnerships as at March 2011, however, few have made innovation a central plank of their proposals. One possible issue surrounds the absence of key, identifiable actors for the implementation of regional science and innovation policies: it is as yet unclear how the relationship between the TSB's regional remit and the nascent LEPs will be defined and developed. (Cunningham et al., 2011).

Regions as partners

Denmark put in place a unique multi-level governance mechanism to align national and regional innovation policies after a major reform in 2007. New regional “**Growth Forums**” had been created in each of the Danish regions where policymakers can discuss innovation policies with representatives from business, labour market and research.

Partnership agreements between the national government and the regional growth forums had been institutionalised in order to ensure alignment between national and regional priorities. In the new setup, the Growth Forum is responsible for innovation policies in the region while the national government is responsible for improving the general business framework conditions in Denmark. Regular evaluations of regional progress have been formalised by the national government as a way of ensuring stronger policy learning between the Danish regions.

In practice this means that the regional council can no longer initiate innovation support activities, which have not been approved by the Growth Forum. The governance and financing of universities and research institutes are not part of the responsibilities of the regional authority in Denmark. Regional Growth Forums have no formal authority regarding the funding of science and technology, however, the regional authorities and the universities have a strong collaboration on specific initiatives approved by the Growth Forum such as programmes to increase the number of spin-offs (Ebdrup, Nielsen, 2011).

Poland: Another example for multi-level governance mechanisms is the Convent of Marshals/Heads of Voivodeships in Poland, where the degree of regional autonomy is important although not completely decentralised. Regions are responsible for undertaking activities of public character that do not fall under the competences of the central government.

The recent National Strategy for Regional Development (2010) adopted a strengthened multi-level governance system and created new relations between the government and voivodship self-governments through the so-called ‘**Territorial Contracts**’. These contracts are made between the central and regional governments in order to agree on the most important objectives and priorities.

It is yet unclear what the territorial dimension given to sectoral policies will mean in practice. Regions underlined that the effectiveness of Territorial Contracts will depend on factors such as a correct identification of contractual parties, clarity regarding the sources of funding, and an appropriate legal framework. (Walendowski, 2011)

Norway: Norway is a unitary state comprised of 19 county administrations. The national government is politically responsible for the Norwegian RDI policies. Initiatives have however been taken by some county authorities to develop research and innovation policies of their own. The Regional Research Funds established in 2010 incorporate the strategic priorities of the authorities of the respective counties included under each individual fund. Respectively, the Programme for Regional Innovation and R&D (VRI), which facilitate innovation-oriented collaboration between regional industry, R&D and public institutions, represents a significant novelty in regionalising research and innovation policy.

Regions as independent policy-makers

Germany: Multi-level policy coordination happens **on the basis of concrete programmes or initiatives**, whereby the regional RDI support activities

complement the national initiatives. The Federal Government and the 16 Länder (Federal States) governments share the responsibility for research and innovation policies with a clear division of duties. The Federal Government takes up a variety of activities in research and innovation policy and may be regarded as the main state actor in the German innovation system. The federal States' main priority in research and innovation policy is to fund universities. They are also involved in science-industry linkages schemes and innovation programmes. There are also a several joint activities of the Federal and the State governments, including joint institutional funding.

Given the diversity of funding channels, German regions are to orchestrate support from different levels to optimise the benefits for regional support. Saxony is one of the regional governments that was successfully able to leverage the opportunities provided in a multi-level governance framework. Federal programmes play a substantial role in funding the activities of innovation actors in Saxony and they provide the basis for regional transformation. The successful regional cluster development for instance is also due to the substantial investment of the Fraunhofer institutions in the region. (Kroll, 2011).

2.4 Networking the regional innovation system

The idea behind regional innovation system (RIS) theories is the quest for flourishing business eco-systems that promote R&D and innovation. Regional innovation systems can be defined as cooperation between firms, higher education institutions (HEI), R&D organisations, supporting public institutions, for economically useful knowledge development, diffusion and use (Asheim, Isaksen, 2002).

Whilst effective governance processes are required in order to develop the regional innovation system and to agree on priorities and targets, there is equally a need for effective institutional channels that can deliver planned support to actors in the region. The institutional framework of regional innovation systems is generally composed of regional councils, regional development/innovation agencies, universities and chambers of commerce etc. In most of the cases a regional innovation/development strategy provides the basis for policy actions.

Aside from government departments and quasi-autonomous agencies set up to deliver all or part of a regional government's strategic policy framework, there is also an increasing role for alternative delivery structures including public-private partnerships (PPP) such as innovation consortium, competence centres, clusters, competitiveness clusters, etc. The 'third mission' of HEIs has also led many universities to play a stronger role in supporting regional economic development.

What is often emphasised in the RIS literature is that it is important to **develop all aspects of the R&D ecosystem**. Successful regional innovation systems depend not only on university, research or education but all services around them such as venture capital, management, legal advisory, technology transfer mechanisms and the right regulations. As Koschatzky outlined (2009), the success factors of regional innovation promotion are:

- An innovation-oriented local or regional institutional system with flexible and open policy networks and capital market: meaning that the regional innovation system is linked with supra-regional, national, supra-national policy levels and integrated into global value chains;
- An institutional structure that is rich in learning and in knowledge transfer;
- Intensive regional networking;
- Presence of creative and entrepreneurial-oriented human capital.

Setting a joint plan for catalysing regional innovation, **regional innovation strategies** serve the purpose to draw up a partnership agreement based on shared objectives. Regional innovation strategies steer policies in support of RDI in the region

assessing the status of research and innovation performance, the particular strengths, opportunities in the region and setting out actions addressing market failures and providing more incentives for RDI. The process of updating these strategies is currently ongoing in several countries that will be a basis for setting the priorities of Structural Funds operational programmes in the period of 2014-2020. The European Commission called for the preparation of smart specialisation strategies (see more in detail in section 2.6) and **focusing more on the inherent place-based opportunities** each region possess rather than imitating successful 'blueprints' of other regions (EC, 2011). Regions vary in size, political structure and economic basis, thus research and innovation support measures must be regionally specific too. This represents a complex policy challenge and calls for new institutions and governance mechanisms (OECD, 2010).

Depending on the key driving force behind regional research and innovation efforts and who is steering the knowledge transfer processes, different models can be identified (see Figure 5), where the regional innovation system can be either mainly science (where strong universities, R&D centres are present and are leading the directions taken in regional RDI policies), market (where large multinational companies or strong business clusters are driving innovation) or policy-driven (in most case peripheral regions, where there is a lack of a strong science-base or strong companies, thus policy plays a crucial role in triggering innovation processes). It has to be noted that such a typology is a very simplified approach to capture the diversity of innovation systems however it is worthwhile keeping in mind when organising the regional governance.

The positive value deriving from establishing intra or interregional learning networks results that regional innovation performance is no longer only defined by the locational parameters but of the ability of regions to trigger such networks (Koschatzky, 2009).

Based on the nature of actors of the regional innovation system, **networking efforts can materialise in cluster initiatives, triple-helix partnerships, centres of expertise, science cities, innovation laboratories, innovation networks/alliances** etc. Triple helix partnerships refer to organising interactions between university, industry and the government. Cluster initiatives and organisations are a very popular tool to develop clusters, cluster initiatives can be understood as “organised efforts to increase growth and competitiveness of clusters within a region, involving cluster firms, government and/or the research community (Sölvell, Lindqvist & Ketels, 2003). Centres of expertise refers to a selection of theme of specialisation where the region can strengthen regional critical mass by pooling local, regional and national resources in the particular field.

Figure 5 Key drivers and organisational basis of regional R&D&I

Driving force	Regional examples	Basis of regional RDI governance
Science-driven: strong universities, R&D centres	Netherlands: North-Brabant, Sweden: Stockholm	Centre of Expertise Science City
Market-driven: multinational companies or business networks:	Northern Central Sweden, Italy: Lombardy, France: Picardy	Triple-helix partnerships Cluster initiative
Policy-driven: (in peripheral position)	Finland: Itä-Suomi, Hungary: Eszak-Alfold region	Innovation networks Innovation living labs

Beyond these more 'traditional' organising principles, there are new types of networks/platforms of innovation becoming popular, such as open living labs. The living lab model includes end-user participation from an early stage of the creative process of innovation. Through partnerships between citizens, businesses and public authorities, the living labs model allows people and industries to test tomorrow's best

innovations. This new type of approach means that the users are fully integrated in the co-creative process of new services, products and societal infrastructures. (EC, 2011)

Keeping in mind that there is no best practice in innovation policy governance, inspiration can be drawn nevertheless from new approaches and delivery mechanisms in certain regions. We also have to reiterate the findings of the RIM annual report that while it was necessary and recommendable to take first steps and to implement standardised good or best practices like the development of regional RTDI strategies across Europe, the challenge ahead is to find ways how strategic plans can be implemented under different framework conditions. Below a selection of cases are provided presenting different regional innovation systems:

Triple-helix partnerships:

Netherlands/North-Brabant: In the Netherlands, the national level is the main responsible for the design and implementation of research and innovation policies. The general model of regional governance is a triple helix partnership: for instance the regional innovation strategy programmes 'Operational programme-South' and 'Brainport 2020' and the 'Peaks in the Delta' programme are implemented by triple-helix programme committees. The Peaks in the Delta programme is a national programme for regional innovation, where West North-Brabant is part of the functional region South-west Netherlands, and the rest of Brabant with the Province of Limburg are taken together as South-east, also labelled as 'Brainport'. One of the particularities of the 'Peaks in the Delta' programmes is the focus on functional regions and 'place-based' RDI. As a result North-Brabant was split into two areas in 2004: Southeast or 'Brainport' (part of North-Brabant & Limburg) and Southwest (West North-Brabant & Zeeland). The programme committee of the Peaks in the Delta includes besides representatives of the involved governments at various levels, also three companies and three institutes of higher education.

Examples of initiatives to foster open innovation include the High Tech Campus Eindhoven and High Tech Automotive Campus in Helmond. Brainport Development, a development agency, is representing horizontal triple helix collaboration, since large companies and SMEs, knowledge institutes and governments at various and multiple levels collaborate.

In 2011, the national government had decided, however, to stop both the 'Peaks in the Delta' programme and the national involvement in the regional development agencies in the framework of the new direction towards decentralising regional development (Wintjes, 2011).

Science city:

Sweden/Stockholm: Stockholm has a strong academic and scientific research basis, especially in ICT and life sciences. In Sweden, the main funding for research and higher education is provided at national level. Stockholm is characterised by a complex institutional setting, with a large number of rather independent actors in both the public and the private sectors. There is no single body responsible for regional innovation; regional development is steered by the County Administrative Board of Stockholm (Länsstyrelsen) and the Stockholm County Council (Landstinget).

The Stockholm Science City Foundation (SSCI) was created in 1990 by the three leading universities KTH Royal Institute of Technology, Karolinska Institute and Stockholm University, together with private actors, Stockholm County Council and the municipalities of Solna and Stockholm. SSCI has been commissioned to develop the life science sector. In 2010, the Foundation Flemingsberg Science was established in cooperation between KTH Royal Institute of Technology, Karolinska Institute and the University College of Södertörn, the Stockholm County Council and the municipalities of Huddinge and Botkyrka, to develop the life science sector in the south of Stockholm. This resulted in a number of development projects, including the ERDF project Powerhouse Life Science. Besides, two joint initiatives with the Uppsala region have

been taken, the first to develop a research center (Science for Life Laboratory), and the second to market the region (SULS).

The ICT sector is highly concentrated around Kista, in the North West of Stockholm. The Electrum Foundation is the key driver behind the developments, commissioned by representatives of the ICT sector (Ericsson, IBM, Packetfront), a real estate company, the research institute Acreo, KTH Royal Institute of Technology and Stockholm Municipality. Two subsidiaries are responsible for the operation: Kista Science City AB and the business incubator STING AB.

Cluster organisations:

Northern Central Sweden: The regional innovation system in Northern Central Sweden is comprised of several cluster organisations, regional higher education institutions and innovation platforms. Since the region is not a functional region, there is no single body responsible for regional innovation policy but the three NUTS 3 regions steer regional RDI policy: Värmland, Dalarna and Gävleborg. There are 15 prioritised cluster organisations, representing about 700 companies and 60 000 employees. Many of these cluster organisations have a key role in regional development and implementation of various policy actions for supporting regional innovation and they have been strongly supported in the implementation of the ERDF programme. Innovation platforms are set up around new business challenges, demanding interaction between different branches and competences. There are several well-established cluster initiatives and innovation platforms related to traditional and up-coming business sectors. (Lindqvist, 2010).

France/Picardy: Research and innovation policy is based on the funding provided to the competitiveness clusters. Two world-class competitiveness clusters (industry and agro-resources and transport and logistics) and another cluster on textiles are located in Picardy and provide a platform for innovative projects. This focus helped the regional policy-makers to capitalise upon regional assets in spite of an unfavourable innovative landscape. Regional and national actors jointly support projects that are considered as important for the regional innovation and economic system. For instance, the region sometimes funds the research part of a project while the innovative part is funded by national resources (Eparvier, 2011).

Italy/Lombardy: Lombardy is an important economic centre with high business density and strong manufacturing sector. There are shared competences between the central and the regional governments introduced by the 2001 constitutional reform, and a regional RTDI strategy was developed. A broad network of organisations contributes to delivering innovation policy: beside the regional administration and intermediaries, the banks also play an important role. A regional innovation policy with emphasis on cluster development was adopted since 2004. The participation of the most important stakeholders (universities, research centres and firms) was promoted and an **intervention model based on meta-districts** was introduced. Meta-district of design has been identified, which links traditional areas of industrial specialisation with the places where knowledge on design is generated. A meta-district is defined as a sectoral cluster that is composed of firms, research organisations, service centres etc. and that is located in different spatial districts but working as part of a strategic value chain. This concept differs from industrial district (specialised spatial agglomeration) and technology cluster (cluster of agents working in the same technology field) (Ciffolilli and Rossi, 2011).

Centres of Expertise:

Finland/Itä-Suomi: Itä-Suomi is one of the most challenged regions in Finland with poor economic performance but with potential in terms of knowledge assets. The region has a rather high share of young people with a tertiary education. Innovation policy is delivered through co-ordinated efforts by a broad network of several organisations including regional councils, municipalities, regional ELY-centres, higher education institutions and various intermediaries. Most of the strategies are designed and implemented at the regional (NUTS3) and sub-regional level.

The Centre of Expertise Programme is a key part of the innovation policy. Local science parks and technology centres are responsible for coordinating regional Centres of Expertise and initiate a range of RDI activities. The centres are tightly interlinked with universities, polytechnics and with key industries in the region. They are actively involved in the RDI strategy development and also participate in the horizontal coordination of sector specific innovation policies. Each regional centre is also networked nationally, improving horizontal co-ordination and division of labour. (Viljaama and Lathinen, 2011).

Hungary/Eszak-Alfold: Another example is the concept of Regional University Knowledge Centres (RETs)³ supported by a national R&D programme in Hungary. The RETs foster the creation of research and technological innovation centres at universities and they are intended to co-operate closely with businesses and accelerate the given region's technological and economic development, thus enhancing competitiveness both at a regional and national level. The RET projects are supported financially by the former National Office for Research and Technology (now National Innovation Agency) and implemented through a consortium. Universities and state-financed, non-profit or other research organisations, and companies can apply jointly. The consortium is headed by a university, and industrial partners must be involved in the project. The activity of the Knowledge Centres is based on research and development including basic research, experimental development and applied research with a well-defined professional focus. Altogether 19 Regional Knowledge Centres have been established in Hungary in the last five years, and these have been conducting internationally competitive, application-oriented research projects. The significant innovation activities and collaboration with industrial partners have caused scientific and economic benefits for all participants, especially for the region. Employment has increased, and university and PhD students have been involved in research and development.

Innovation living labs:

Italy/Trento: In the Italian region of Trento a new collaboration model was developed in the form of an innovation laboratory. The model – called Trentino as a Lab - is the territorial network for innovation in the ICT area, which promotes innovation of public administration services. It intends to activate an open innovation mechanism where the regional research capacity is exploited to drive innovation by technological advances resulting from public-private collaborations. The 'Trentino as a Lab' initiative is also partner of the European Network of Living Labs. The overall goals are to foster innovation focused on societal and business needs in innovative sectors and niches; accelerate the availability and accessibility of the public information repositories and data banks to allow reuse, increase transparency and participation of citizens and firms, and to generate business opportunities related to the creation of new services. A common platform for the experimentation of a new generation ICT services has been also set up (TestBed). This involves both firms and public research centres and exploits the 800 km broadband infrastructure that covers the entire territory and includes a Hiperlan wireless network with 700 access points. (Ciffolilli, 2011).

2.5 Funding instruments

The capabilities of regions in delivering RDI policies depend on the budget and responsibilities allocated to them as also noted earlier. Evaluations of regional research or innovation funding schemes point to varied challenges in respect of implementation and governance.

The advantage of a bottom-up approach in RDI funding, where regional authorities are directly managing RDI funds is that it can better **take into account the key**

³ <http://www.nih.gov.hu/english/regional-knowledge/peter-pazmany-programme>

regional assets and technological or scientific specialisation. Regional actors are much better placed to tell which areas/sectors are the most promising to be developed and a regionalised approach means cultivating organic initiatives rather than unrealistic central efforts. On the other hand a top-down approach is often coupled with more **emphasis on excellence and strategic, large-scale developments**. The 'absorptive capacity' (Howells, 2005) of regions is another issue of concern related to their abilities to generate enough regional initiatives and leverage enough private funding that exhausts the available budgets. This needs attention in terms of its institutional and organisational implications.

At regional level there is often a **fear of fragmentation of funding** resulting in too much small-scale projects without enough leverage effect as the example below from Wales also shows. Concerns also include an increased level of administration costs and further bureaucracy. For instance, in Portugal, the transfer of RDI policy competences to the regional level introduced an **additional administrative burden** in the case of certain support measures. Nevertheless, the regional RDI funding instruments have been seen positively, since it enabled the development of a better dialogue between applicants and the administration, thereby easing the process. The evaluation of the National Strategic Reference Framework (2010) has suggested that the methods of implementation have been improved, however, the need to improve for instance a better project follow-up was pointed out (Mira and Corado, 2011).

It is often emphasised that policy-makers should be clear about the potential impact of research investments under specific regional and technological circumstances and a multi-actor, multi-level perspective is seen as more advantageous (EC JRC, 2008). There is certainly a need for better alignment of resources across levels of government and also greater leveraging private sector resources.

Regional examples where regional institutions manage own RDI funds can offer useful lessons learnt:

UK/Wales: The major RDI funding schemes in Wales include the Business Innovation Programme, Academic Expertise for Business (A4B) Programme and the RD&I funding programme. Research, development and innovation funding is available on a repayable loan basis and includes support for technical and commercial feasibility, industrial research, experimental development, exploitation. The RIM report on Wales (2011) pointed out that although these programmes represent comprehensive support to innovation, stakeholders criticise that they are not well integrated resulting in **fragmented support** and limited opportunities for synergies across programmes. Another concern is that R&D funding investment tends to be **concentrated on relatively small projects**. While this maximises the number of companies that can be supported it limits the potential for more strategic projects with larger impact (Thomas and Henderson, 2011).

The Academic Expertise for Business (A4B) programme is seen as a successful example in the region supporting knowledge transfer between Welsh higher education institutions and businesses. It was launched in 2008 with a total budget of £70m. Regular monitoring and evaluation is a good practice feature of A4B, and includes both mid term and final evaluations. Results from evaluations conducted on predecessor programmes suggest that long term funding in this area of support has helped to generate important cultural changes amongst the university and further education sector in relation to innovation, spin-out companies, IPR, licensing arrangements and collaborative R&D. This has seen the strategic focus of institutions broadening out to include business links and commercialisation, alongside the core missions of teaching and/or research. It has also resulted in the introduction of new, innovative practices towards the development of products and processes, engaging with SMEs and venture capital providers.

France/Brittany: **Regional competitiveness poles are one of the most important funding channels** in support of regional RDI. The poles benefit both from national, Structural Funds and regional funding. Collaborative R&D projects and

the management bodies of the poles are supported. An evaluation of the regional innovation policy and competitiveness poles was carried out in 2008, which found that regional policy had boosted innovation capacity of targeted sectors: innovative SMEs with new competences developed; SMEs-large groups-research partnerships were formed; research organisations and schools of engineers were involved in an effective manner. Nevertheless, the **strategic coordination between national and regional administration is an area to be strengthened**, the monitoring of the policy is almost exclusively financial, beneficiary SMEs view the regional support more as a source of additional funding than a fully-fledged innovation policy.

The mid-term evaluation of the Structural Funds operation programme 2007-2013 (2010) revealed further insights about regional research and innovation projects. It was found that although multi-annual large-scale research projects involve diverse actors and produce 'structuring' economic effects, however, a drawback is the lack of flexibility in funding of emerging research topics (Lacave, 2011).

Finland/Pohjois-Suomi: The latest Centre of Expertise Programme (running in the period of 2007-2013) was evaluated in 2010. The role of the centres is important in connecting regional research results and technologies with the key industry. The operational model of the programme builds on the regional clusters as new platforms for development. The programme focuses on internationality in R&D and business activities, boosting the growth of knowledge-intensive companies and linking the programme closer to national innovation policies. The evaluation concluded that the cluster-based model and the national dimension of the programme allowed a better utilisation of synergies and decreasing overlapping of duties in regions. The centres of expertise in Pohjois-Suomi have had a **moderate impact in directing regional resources and knowledge capabilities**, but this impact varies in different sub-regions.⁴ When comparing the innovation policy mix to the innovation and economic performance indicators, it can be assessed that the innovation policy activities can be linked in some ways to the positive development in the higher education R&D, especially in the development of R&D infrastructure but also R&D activity. The current policy mix was found not to be adequate due to lack of skills, capabilities and resources towards RDI. It was also pointed out that the particularly promising industry requires national level support. (Viljaama and Lahtinen, 2011)

Scotland: Scottish Enterprise launched R&D Plus in 2004 to **foster R&D activities of large companies** engaged in Scotland. The scheme provides discretionary grants of up to 25% of eligible costs to undertake development of new products or processes to the pre-production prototype stage that demonstrate real potential for global commercial success. The 2009 evaluation of R&D Plus project concluded that there is a strong reason for continued and increased support; it makes a substantial contribution to economic development activity in Scotland and there is a good maximisation of resources. There was strong belief that the programme has had an impact on firms' R&D capacity and spends, their turnover and employment, and therefore it is having a positive impact on the wider economy. The programme was assessed as presenting good value for money, despite the high levels of initial investment required.

The evaluation suggested that first the potential should be explored to provide a portfolio of support across the R&D, manufacturing and training and development needs of companies. Consideration should be given to looking at different levels of grant intensity depending on the nature of R&D and subject to the project not falling below a minimum value for money threshold. Account managers and innovation specialists were encouraged to work more closely with companies to make greater linkages with suppliers, universities and other collaborators to enhance any spill-over effects. (RIM, 2011)

⁴ http://www.tem.fi/files/27402/TEM_44_2010_netti.pdf

2.6 Thematic focus

Several regions have been following a thematic focus in their research and innovation policies in many cases via a policy for cluster development. The recently emerging societal-technological challenges and the tightening public budgets as a result of the economic crisis also divert towards better concentration of resources.

The new smart specialisation agenda promoted through European regional policy (2011) calls for greater prioritisation and concentration on local strengths/niches and interregional linkages. The concept of **smart specialisation refers to the importance of strengthening existing strengths** and to engage in an entrepreneurial process of discovery in what the region can do best. The definition of a smart specialisation strategy goes as “smart specialisation involves businesses, research centres and universities working together to identify a region’s most promising areas of specialisation, but also the weaknesses that hamper innovation”.

The RIM thematic report (2011) showed that it is advantageous for regions to concentrate efforts on building upon existing strengths and develop successful related technologies. It also noted that smart specialisation is not necessarily about focusing on a single sector but about fostering cross-sectoral linkages. The path to future developments seems to be the ability to **shift traditional industries into emerging areas** through new enabling technologies. An example is the automobile industry moving towards sustainable mobility in Baden-Württemberg.

Albeit, the potential to change specialisation patterns for more knowledge intensive services or higher-tech and higher value added manufacturing sectors is dependent on the innovation system that is in part fostered by public policy interventions (Innovation in the Baltic Sea Region, 2011). In this respect, the Baltic Sea region for instance, appears to be specialised in a certain number of key technology fields, notably ICT and biotechnology. Common specialisations can offer a potential for joint interregional programmes as well.

Two examples of thematic prioritisation are provided below from Scotland and Flanders.

Scotland: Regional governments are increasingly seeking **to optimise costly investment** into research infrastructure in the public and higher education sectors. One approach to co-ordinating the management of research investments and research teams working in the same field at various institutes is the **research pooling initiative** developed in Scotland since the mid-2000. Research pooling has been supported, in part, with the aim of ensuring that infrastructure and equipment available across the 19 Scottish universities is used optimally to further research in specific scientific fields such as in engineering, geoscience, environment, life sciences, marine, informatics etc.

The pools can help businesses and other organisations in Scotland to innovate and grow. They do this through providing a single front door to academic expertise in key sectors such as energy, life science and computing. By engaging with research pools access can be gained to specialist knowledge, skills and facilities. More recently, the research pools have sought to develop stronger partnerships with industry and use the pooled resources to promote Scottish research internationally.

An example is the SINAPSE research pool through which six Scottish universities are working together to advance significantly research into conditions such as strokes, Alzheimer's disease, schizophrenia and cancer. SINAPSE (The Scottish Imaging Network: A Platform for Scientific Excellence) brings together experts from the universities of Aberdeen, Dundee, Edinburgh, Glasgow, Stirling, and St Andrews and is the world's first virtual clinical imaging laboratory. The £40 million initiative focuses primarily on imaging of the brain, using state-of-the-art technology that includes magnetic resonance imaging (MRI) and positron emission tomography (PET). Pooling resources across Scotland, the partnership combines the collection of different types of brain information such as structure, function and brain waves, and

develops new radioactive tracers for different diseases. This will enable further research into strokes, dementia, diabetes, cancer, and mental health.

Belgium/Flanders: Smart specialisation policies received great attention in Flanders. Milestones have been outlined such as the setting of regional innovation priorities and assessing the current strengths and weaknesses. The 'Flanders in Action' policy plan sets out societal focal points in Flanders and identifies strategic breakthroughs, crucial for the future wealth and well being of all in Flanders. The Flemish Science and Innovation Policy Council proposed six strategic clusters based on a SWOT analysis of Flanders that later were redefined into 'spearheads' for technology and innovation. They are Transportation - Logistics - Services - Supply chain management; ICT and Services in Healthcare (e-health); Healthcare; New Materials - Nanotechnology - Manufacturing industry; ICT for Socio-economic innovation; and Energy and Environment. The spearheads are relatively broad and do therefore not necessarily target niches, however, a tool is being developed for strategic monitoring by specialisation profiles (Bruno and van Til, 2011).

3. Key challenges

According to the OECD (2010), the major emerging trends which are reshaping innovation and which require regions to react through their RDI programmes are: the increased globalisation; the rising demand for innovation to address social and environmental challenges; and the increased relevance of networks to the innovation process. Moreover, two further key challenges lie ahead in regional research and innovation policy governance that could be identified based on the analysis of RIM regional reports: capacity-building and multi-level governance.

- **Increased globalisation**

Globalisation will on the one hand increase the need for regional actors to identify their endogenous sources of growth and it will also open new opportunities for organising research and production across borders, favouring the mobility of talent and the opportunities for international collaboration (OECD, 2010). Regions will have the challenging task to find the 'white fields of innovation' (Vinnova, 2010) that is happening at the interface of different sectors. Solutions often can be found across the boundaries of the biotechnology sector, ICT, creative industries, chemical industries etc. New enabling technologies can give scope for the development of better products and services. The complementary expertise is not always to be found within the region itself that calls for new types of international collaborations, new strategic partnerships, new way of thinking.

- **Demand for innovation to address social and environmental challenges**

Regional governments are challenged to use their capacity to support the well-being of the regional community. Here, a coordinated effort is needed where the institutional responsibility may be fragmented across different levels of government. For example, implementing green growth strategies will require coordinated efforts both on supply (new technologies, new energies, new patterns of production and trade) and demand-side. (OECD, 2010) Regions will need to develop new types of instruments along with public procurement of innovation or pre-commercial public procurement that can foster solutions for societal challenges such as climate change or demographic changes.

- **Increased relevance of networks**

Regional authorities are to maintain both intra and interregional linkages and to foster effective policies both of "local buzz" and access to "global pipelines". Connecting the regional, research and innovation system actors is a common challenges across

regions in the EU and beyond. The regional innovation system may be composed of many fragmented support organisations, and complementarities between the different actors are often insufficiently exploited. Developing the regional triple helix and strong partnership between all actors of the regional innovation system is still on the agendas of regional research and innovation policies.

Related to networks, another challenge is creating leadership. The nature of network-like cooperation is based on reciprocity, trust, solidarity and confidence, where both shared power and leadership should be accepted. Leadership means the ability to maintain and deepen the sense of mutual benefit that exists within the network by enhancing network connectivity, integration and transparency. (Vinnova, 2010)

- **Capacity-building**

Regional RDI policies are a relatively recent phenomenon, thus not all regional authorities did have enough time yet to build up strong regional governance mechanisms. Consequently, one of the major challenges for regional authorities is the development of competences in designing, managing, monitoring and evaluating RDI policies. A further issue is to utilise policy intelligence tools more extensively and realise policy evaluation exercises more systematically. Such intelligence tools include foresight studies, sectoral road mapping and trend analyses.

Capacity-building is necessary both in terms of administrative capacities and human resources development. Regional authorities and regional organisation put in place to deliver policies should be prepared to tackle changes in the nature of innovation thus calling for more user-driven approaches or new interregional and intraregional partnerships.

- **Multi-level governance**

Coordination mechanisms among national/regional/local actors responsible for research and innovation policies are indispensable, since the lack of good multi-level governance can lead to unnecessary duplications, missed leverage effects and less synergies. The lack of co-operation between different levels of governance is often reported in the RIM regional reports. For instance, there might be no clear division of responsibility between national and regional administrative levels in certain cases that results in overlapping instruments and programmes. The goal of regional systems should not be to duplicate national innovation systems but bring in additionality and help to exploit regional strengths. Discovering new ways of coordination is a challenge both for national and regional research and innovation policies.

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