



**EXPERT EVALUATION NETWORK  
DELIVERING POLICY ANALYSIS ON THE  
PERFORMANCE OF COHESION POLICY 2007–2013**

**TASK 1: POLICY PAPER ON INNOVATION**

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## 1 EXECUTIVE SUMMARY

Summarizing the contribution of ERDF in innovation policy, the following points emerge. ERDF is implemented on Länder level. On this level ERDF funds play an important role in supporting the Länder innovation strategies. The financial share of ERDF in Länder spending for innovation is significant (10% for competitiveness, 30% for Convergence regions). With the words of John Bachtler and his colleagues, ERDF is “subsumed” under the domestic policy: Funds go to the same instruments, but the decision making is dominated by the domestic side, not ERDF-strategies.

Reflecting a general peculiarity of the German federalism, the implementation of ERDF on Länder level also means a focus on specific parts of the regional innovation systems: applied research, the transfer system, and R&D in enterprises. In recent years there has been a trend to complement the direct support for R&D in enterprises by 1) training and consultancy and 2) instruments supporting market introduction. The strategic orientation of the convergence programmes can be summarised as follows: Targeting the R&D in enterprises, the strategy aims at strengthening basic functions of the regional innovation systems. The strategic focus is on adjusting the deficits of the respective system. The strategic orientation of the competitiveness programmes is to improve performance of the respective systems. The variation in the policy mix is higher among competitiveness programmes. With this strategic profile ERDF funding in particular and Länder innovation policies in general are addressing the very field that has been identified as a weakness in the national innovation system: the application and transfer of knowledge and its economic valorisation (Expertenkommission Forschung und Innovation 2010:22)

Systematic Evidence on outcomes and results is rare. Monitoring systems vary even in the financial data. There is no coherent set of indicators. Furthermore the way of collecting data and its processing varies between the Länder. Often the information used to create a monitoring system is too generic as the planning takes place on a more abstract level (of priorities, not instruments). Studies and annual reports are comparatively old. All in all, we can only analyse data up to 31 December 2008.

The innovation related policy initiatives show comparatively quick progress in terms of financial implementation. Significant project numbers are being implemented. As to the results, in the literature R&D projects for enterprises are assessed as successful instrument. Studies suggest an increasing innovation capacity of the participating enterprises. Participants in joint research projects show an above average growth in turnover and employment. There are positive effects also in infrastructure – although often not carefully adapted to the regional needs and often overdimensioned. The effects of cluster and networks are less visible, but single studies suggest a positive effect as well: So, an analysis of the network strategy in Saxony reports that enterprises in networks have achieved a better market position (Ossenkopf et al. 2004). A study for Bremen shows that ERDF contributes significantly to the development of regional innovation systems

(Bornemann, Rautenberg, und Breuer 2010). The coherent regional strategy is an advantage as it allows to establish an adequate basis for cooperation networks.

A few overarching effects of funding are reported in studies carried out independently from specific policy instruments: In small enterprises in East Germany, public funding amounts to some 40% of the R&D expenditure (Konzack et al. 2009). The main aim of enterprises investing in R&D is market expansion and increase in turnover. And in fact some results show that enterprises achieve higher turnover and more employment by investing in R&D (Czarnitzki und Licht 2004; Rammer und Peters 2010).

From the regional perspective, innovation policy has been contributing to the structural adjustment in East Germany (Koschatzky et al. 2005) – but the effects depend on the adequate policy mix. Transfer and infrastructure support in particular need to be carefully adjusted to the regional needs.

As to the appropriateness of the funding, more or less the same pattern of policy mixes is used across the Länder. Even the differences between Convergence and Competitiveness Länder are not huge. Both the Länder policies and the ERDF support seem to be appropriate. There might be a need for adjustment and more detailed analysis in one case or the other, but the overall approach seems appropriate. This is in line with the general assessment of the importance of the Länder innovation policy (Bundesministerium für Bildung und Forschung 2008). The focus on transfer and structural change is an essential part of this strategy.

The main challenge for the future is continued support for regional innovation systems. A multi-annual and strategic approach with a comprehensive set of instruments for the development of regional innovation systems – mainly for the application oriented part – is essential for regional development. Additional aspects could be integrated: Innovation in services deserves more attention, creative industries play an important role.

## **2 NATIONAL AND REGIONAL INNOVATION POLICY AND THE CONTRIBUTION OF ERDF**

This chapter gives a brief overview of innovation policy in Germany and the role of ERDF within this context.

### **2.1 NATIONAL AND REGIONAL INNOVATION POLICY<sup>1</sup>**

The basic structure of the German innovation system consists of the following groups of actors: Politics, public research (universities etc., but also four important national associations of different

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<sup>1</sup> See Annex E for more information and statistics.

types of research institutes), enterprises, and intermediaries (foundations, German Research association, etc).<sup>2</sup>

Gross spending for R&D in Germany amounted to 61.481,98 Mio. € in 2007. R&D activities are not equally distributed across Germany. More than 45 % of the national investment in R&D is spent in only two Länder (Baden-Württemberg and Bayern, south of Germany). Amongst the convergence regions in the East of Germany, Sachsen achieves the highest share of the total German R&D spending with 3,6 percent. But also the share of some of the competitiveness regions does not exceed 1,0 percent of the national R&D spending (Bremen, Saarland).

On average R&D spending amounts to 2,53 % of the GDP. Only two of the Länder (Baden-Württemberg and Berlin) exceed 3% . In the former this is due to an above-average contribution of the private sector, while in the latter it is due to public spending. A few Länder like Saarland or Sachsen-Anhalt only spend approx. 1% of the GDP in R&D.

The Convergence Regions are also the Länder with the lowest R&D spending per capita labour force – between 580 and 800 €. Only Sachsen exceeds the average value of the Convergence Länder significantly (1.236,70 €) and spends more than some of the Competitiveness Länder. Again Baden-Württemberg is far ahead with 2.837,67 € per capita.

R&D spending is predominantly financed by the private sector (68%). The private sector's contribution in Germany is higher than the EU average (52%); the national average of the public contribution to R&D is 28% , though with significant variations federal and Länder level account for 50% of the public R&D spending.

There is significant variation between regional innovation systems at Länder level. From the special point of view R&D in Germany is concentrated in the South, and in terms of EU-objectives, the bulk of German R&D is to be found in Competitiveness regions – although there is no sharp separation between Competitiveness and Convergence regions: the most developed convergence regions (esp. Sachsen and Thüringen – again: the south – of East Germany) have better Innovation systems than some of the Competitiveness regions (e.g. Saarland, Schleswig-Holstein).

In the federal system of Germany there is no strict separation of responsibilities between the levels in the field of R&D. Some aspects, like funding of universities are assigned to the Länder level, others like institutional funding of non-university R&D institutes is shared. For instance most of

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<sup>2</sup> Specific bodies are selected to implement the programmes ("Projektträger"), mainly for the programmes at federal level (Polt et al. 2010:153f.). This is a distinct feature of the German innovation system. Programme implementation is neither managed directly by the administration nor by specific public agencies. Instead, implementation is organised by programme, so that a number of different actors (Projektträger) is involved. They have different forms of organisation. The idea is to involve the technical and scientific expertise of the Projektträger in programme implementation. There is limited number of organisations acting as "Projektträger". It is usual for one Projektträger to manage several programmes, see <http://www.bmbf.de/de/381.php>

the institutional funding of research facilities is the shared responsibility of both levels. Generally speaking, both Federal and Land level are involved in institutional as well as project funding.<sup>3</sup>

On the whole the Federal level's role is stronger in basic research and that Länder are more important in applied research and in application in the private sector. But this is only a very general rule: The federal level for instance also provides instruments for networking and R&D in enterprises. Nonetheless, Länder funds are predominantly used for funding projects with clear orientation to economic application. To a smaller degree Länder invest in infrastructures; activities to support structural change, e.g. from traditional industries to high-tech and services and to meet the needs of new markets have specific importance at Länder level (Bundesministerium für Bildung und Forschung 2008:307). The Länder activities comprise both project support, and institutional support; in the former they are focused on applied research and economic development; basic research is hardly covered. All Länder launched initiatives in the field of biotechnology, micro- or nanotechnology or ICT, but have chosen different focuses. In the field of biotechnology for instance, the stress is either on medical applications or industrial products. Both the general orientation of the Länder policies and the variations are seen as a significant contribution of the federal structure towards the development of regional competencies, thus strengthening the whole German research and innovation system (Bundesministerium für Bildung und Forschung 2008).

It is difficult to give overview of the interaction and coordination between levels in the field of innovation policy. The roles vary depending on the specific parts of R&D-policy. Generally speaking, the policy developed in an evolutionary process (Fier und Harhoff 2001). So, interplay and coordination mechanisms between levels vary in patterns and processes. For instance, the funding of universities is predominantly the responsibility of the Länder. The bulk of public research institutes are financed through a cooperative arrangement at Federal and Länder level – but in some cases both levels fund complementary research institutes separately.

As ERDF funds are predominantly spent on project support and focused on the application phase and the private sector, the coordination in this field is of particular relevance. The mid-term evaluation of the Joint Community Support Framework 2000–2006 states that the East German Länder mix support for single projects, joint projects, and competitive programmes in an “eclectic” way (GEFRA Gesellschaft für Finanz- und Regionalanalysen et al. 2003:340). The relation between the Land and the Federal approach does not follow a general pattern in this particular field. Another study on innovation policy in the eastern part of Germany characterises the Länder policies as follows (Koschatzky et al. 2005:71ff.):

- Emphasis is on support for enterprises, both single or joint projects.

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<sup>3</sup> Institutional funding is the continuous financing of public research institutes. Project funding is the project related funding predominantly targeting the private sector.

- The objectives of both federal and Länder programmes are more or less the same: strengthening key technologies in the private sector, developing technology oriented networks and increasing R&D capacities.
- Länder are aware of the federal instruments when designing their policies. They complement the federal funding, e.g. by targeting beneficiaries not covered by federal programmes or by providing follow-up financing. Länder instruments tend to be more differentiated compared to federal programmes.

Although these findings relate to East Germany, they also apply to the western Länders. There is no active and explicit coordination, and the Länder adjust their own instruments to the Federal programmes. Although there is no evident coordination problem, there is a danger of accepting windfall gains and producing crowding-out effects by developing too many similar programmes (GEFRA Gesellschaft für Finanz- und Regionalanalysen et al. 2003:340). The problem lies more with the coordination between the Länder than with the coordination between Federal and Länder level.

The Länder interventions complement federal funding, but not within a coordinated systems. Rather, the federal instruments are considered as a kind of backbone with the Länder interventions grouped around. But the evolutionary character of the whole system might give rise to overlaps and incoherencies between Federal and Lander funding.

### ***Role of ERDF***

In the field of innovation and R&D, ERDF is only implemented on Land level. Financially speaking, the ERDF contribution amounts to a significant share of the Länder R&D investment.<sup>4</sup> On average, ERDF contributes approx. 10 percent to the Länder R&D expenditure. The share varies and reaches 30 % in the convergence Länder but is only 4% on average in the competitiveness Länder. In conclusion, ERDF plays an important role in strengthening the Länder R&D policies. Within the innovation policy at Länder level ERDF is mainly focused on applied research, transfer, and R&D in the economy. Nearly all relevant Länder programmes aimed at strengthening R&D and innovation are ERDF-co financed.

For the Convergence regions, a total of 3.143 Mio. € ERDF is available for innovation. This is 27,7 % of the overall ERDF funds in the period 2007–2013. In competitiveness regions, the ERDF budget for innovation is 1.853 Mio. € (39 % of the total ERDF). Innovation and R&D are essential for all German ERDF-programmes (with the exception of the only sectoral program for transport infrastructure at federal level).The economic application of innovation is one of the strategic backbones of the Länder development strategies. Other essential strategic elements are the support for en-

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<sup>4</sup> See Annex F for more details.

terprises, and integrated urban/regional development programmes. But innovation is broadly accepted as an important element for regional strategies of growth and sustainable development.

In some programmes, there is a tendency to expand the scope of innovation beyond the initially targeted technical innovation. Some Länder focus on knowledge society (Berlin, Bremen) or on the service sector (Nordrhein–Westfalen). This might indicate a trend towards a broader approach towards developing and using knowledge, even aspects like societal innovation are covered in part.

Convergence and competitiveness regions make use of a core set of common instruments:

- R&D projects in enterprises (both for single beneficiaries and joint projects)
- R&D infrastructure in the form of applied research (mainly technical equipment of research facilities and universities)
- Networking and Cluster activities

Other instruments like new financing instruments, E–government initiatives, and support for start-ups, incubators, etc. are to be found in a number of Länder. Competitiveness regions tend to put less emphasis on infrastructure and to apply a broader variation of instruments, some smaller types of instruments are only applied in competitiveness regions: approaches for training, transnational cooperation and experimentation.

Most of the instruments and initiatives co-financed by ERDF funds are not exclusively created for ERDF implementation, but form part of the existing policy mix. Support programmes often existed already in the previous programming period. Therefore, rather than specific and new policy initiatives ERDF funds specific interventions<sup>5</sup>

It is common that the individual instruments are integrated in a Länder-specific innovation strategy. The quality of these strategies varies, however most of the Länder at least identified fields of competence and formulated a strategic orientation for their policies. Coordination and strategic targeting are essential success factors for a coherent innovation policy (Bornemann, Rautenberg, und Breuer 2010).

## 2.2 ERDF CONTRIBUTION ACROSS POLICY AREAS<sup>6</sup>

ERDF support for innovation in Germany in most Länder comprises a number of common activities: R&D in enterprises, R&D infrastructure and Networking and Cluster are present in most ERDF programmes. But beyond these common elements, the policy mix differs. Overall profile of the ERDF contribution in Convergence and Competitiveness regions are described in the following paragraphs, which analyse the Operational Programmes (see Annex), the financial data on the basis of

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<sup>5</sup> This is only the general picture. Certainly there are a number of new instruments or approaches in the programmes.

<sup>6</sup> See Annex A, table 2.



the figures provided by the Commission, and the feedback and comments of the Managing Authorities on an earlier draft of this paper.

### ***Convergence***

In the convergence programmes, the main emphasis is on the policy area “Knowledge transfer and support to Innovation Poles and Clusters” (two thirds of the overall ERDF budget for innovation 65,54 %), followed by the area boosting applied research (23,86%) and Innovation friendly environment (10,60%). The programmes have a strong element of infrastructure investment (31,13%), but all in all business oriented measures (R&D projects, transfer and networks, and other measures to stimulate R&D) outweigh the infrastructure elements with a total share of 44%. Infrastructure too is focused on application oriented investment.

The main recipients of this funding are enterprises and research institutes/universities; Institutions from the transfer and intermediary system are a third group of recipients. Main measures for enterprises are direct support via grants for R&D projects – either for single beneficiaries or for groups of beneficiaries, partly focused on specific fields of technology (mainly environment- or energy-related). Measures to support networks and clusters mainly deal with cluster management (organising meetings, exchange platforms, etc.). The funding for infrastructure complements this by supporting technical equipment required for applied research.

The ERDF support is an integral part of the Länder innovation policy. The main Länder measures to support R&D in enterprises are ERDF co-financed. All in all, one third of the Länder innovation policy is ERDF funded. This profile of the ERDF innovation support fits well with the general division of labour between federal and Länder level: The main focus is on activities that establish a link between applied research and R&D in the economy on the one hand and boost R&D in enterprises on the other.

Inter-regional cooperation is not relevant for the Convergence Länder.

### ***Competitiveness***

In Competitiveness regions a lower share of Funds is spent on Infrastructure: only 17% compared to 31% in Convergence Regions. Consequently, the weights of the policy areas differ: Knowledge transfer and poles has the highest share with 46,6%, but boosting applied research reaches 35,8% and innovation friendly environment 17,6%. The concentration of Funds on one policy area is weaker than in Convergence regions.

The most important measure is networking and cluster development. As to support to firms, it is not so much direct support for R&D projects, but rather supporting activities either 1) to bring innovative products to the market or 2) to accompany innovation processes by means of external assistance. Both advanced services for firms and investment linked to R&D have a share of some 10%. As in Convergence regions, the main recipients are enterprises, but they are targeted with a

more diversified set of instruments. Other important addressees of the funding are universities and transfer actors although they are less important than in convergence programmes.

Compared to Convergence programmes, where – with the exception of the region of Lüneburg – the pattern across policy areas and measures is very similar, the Competitiveness programmes show a greater variation in policy mix. This reflects the broader variance in socio-economic context conditions (see above) in Competitiveness regions: The Länders' approach depends on the situation of the respective regional innovation system.

As in Convergence Regions, ERDF support forms part of the Länder innovation policy. It contributes to the most important Länder instruments, although the ERDF-share is significantly lower. The general pattern is the same: ERDF contributes to the overall Länder policies.

Interregional cooperation and exchange with explicit focus on innovation policy is part of the strategy of two Länder (Nordrhein-Westfalen, Hessen). The main purpose is to learn from other regions and improve the support structure for innovation and innovation policies. In that respect, interregional cooperation is similar to experimentation, which is used in three other programmes to improve and develop policy.

### **3 EVIDENCE AVAILABLE ON THE PERFORMANCE OF INNOVATION MEASURES CO-FINANCED BY ERDF**

Systematic evidence on actual implementation across the different programmes is rare.<sup>7</sup> The only possible solution is to use the national strategic report (Bundesministerium für Wirtschaft und Technologie 2009), but the definition of policy areas in the report differs from that of the present study.

Ex-ante-Evaluations and the evaluation of the previous programming period are available for individual programmes. The studies are mainly based on the analysis of the monitoring data and discussion of the potential effects. This is both true for the ex-ante and the mid-term evaluations, including the update of the latter. Beyond output information, only few evaluations explicitly provide evidence on outcome and result. The studies are dominated by statements declaring the expected contribution of the intervention to selected targets – or by analysis of the targets achieved. Discussion of net-effects is rare. In this chapter, we report only the evidence from evaluations, where explicit statement on outcome and/or result is made, but not necessarily on the net-effects.

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<sup>7</sup> Programmes are not coordinated in terms of physical indicators, so no common core set is available. Furthermore, the standard financial tables required for the annual reports are not interpreted identically in the different Länder. The last annual reports available are those for the year 2008. The 2009 annual reports are just being prepared while this report is being drafted.

Besides the evaluations directly related to the Operational Programmes, another layer of evidence emerges from studies undertaken on specific national instruments. When ERDF contributes to the funding, they are also of relevance here. An exhaustive overview of this kind of studies is impossible: In some cases where they exist, they are not known to the MA, in others, they are not published. Thus we can only refer to a few selected studies of this kind here. Their key results are presented in the next paragraphs.

Finally, a third layer of evidence consists of research that does not specifically deal with single instruments and the broad range of relevant academic research. A bulk of relevant research exists. A few selected studies with a direct link to funding policies is reported in the next paragraphs. It is striking, how little notice the Structural Funds evaluation take of the academic research.<sup>8</sup>

All in all, we can by no means claim that we present a complete literature overview here. The main focus is on exploiting the evidence from the official documents related to SF, mainly the annual reports plus the evaluations of SF-programmes. Beyond this, in the field of national evaluations and academic research, coverage is incomplete as a comprehensive literature review goes beyond the scope of this study.

Although most Operational Programmes were only approved in the second half of 2007, already one quarter of the indicative budget had been approved by the end of 2008 for both competitiveness and convergence lander. Expenditure only reaches 5,4 (Convergence) and 7,7% (Competitiveness).

The latest figures available are part of the Strategic report 2009, where financial indicators at 30 September 2009 are reported (Bundesministerium für Wirtschaft und Technologie 2009:226ff.). The figures are not broken down into financing categories. Thus it is difficult to assess to what extent they apply to the innovation policy parts of the programmes. But as the innovation policy instruments show a comparatively quick progress, it can be assumed that they may be more advanced than the average. An average 36% of the funds had been approved by end of September 2009 in the German ERDF-programmes. The programme of Bremen (Competitiveness) is the most advanced with 68% commitment, followed by most of the Convergence programmes with 40 to 50%. The report only presents expenditure declared to the Commission, which is 7,1% for the ERDF on average.

### **3.1 ACHIEVEMENTS UNDER THE CONVERGENCE OBJECTIVE**

Generally speaking, the operational programmes of the Convergence regions emphasise boosting applied research as well as knowledge transfer.

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<sup>8</sup> To access this type of studies, the homepage of the expert commission research and innovation is a good starting point: [www.e-fi.de](http://www.e-fi.de).

	Innovation friendly environment					Knowledge transfer and support to innovation poles and clusters				Boosting applied research and product development				
	Financing instruments for technology oriented enterprises	E-learning and E-knowledge	Infrastructure for spatial data	Development of E-Government	Education and Training	Network and Cluster management	Transfer "via heads" – Innovation assistant	Incubator Centres/Technology Centres	Transfer by cooperation projects	R&D projects in enterprises	R&D-Projects for specific fields of technology	Supporting start-ups	R&D Infrastructure (Universities and research organisations)	Economy oriented R&D projects of research organisations
OP Brandenburg	x	X	X			X	X	X	X	X	X	X	X	
OP Mecklenburg-Vorpommern				X						X		X	X	X
OP Sachsen	(X)	X		X	X	X				X	X	X	X	X
OP Sachsen-Anhalt	X					X		X	X	X	X	X	X	
OP Thüringen		X		X	X	X		X	X	X	X	X	X	X
OP Niedersachsen				X		X	X	X		X	X		X	
Total (number of Ops with the respective instruments)	3	3	1	3	3	5	2	4	3	6	5	5	6	3

Beside direct support for R&D, establishing the infrastructural preconditions is important and part of all Convergence programmes. The policy area of innovation-friendly environment is less prominent in comparison. The OP of the Lüneburg region in Niedersachsen has a slightly different profile – but this is a special case as it is a region in former Western Germany bordering Hamburg and has a specific socio-economic situation that differs from the remaining Convergence Länder in East Germany.

The annual reports are no rich source of information on outcomes and results. The collection of C quantified information was not coordinated, which makes it difficult to collect data across Länder. Furthermore, the Länder way of collecting data differs: Some Länder count all approved projects, others only finished ones. The following table, therefore, combines different qualities of information (plan data vs. actual data). And in any case: these are gross-effects in the best case. Only a selection of core indicators included in several programmes is presented.

	Brandenburg	Mecklenburg-Vorpommern	Sachsen	Sachsen-Anhalt	Thüringen	Niedersachsen
Investment in R&D (Mio. €)	1,118		0	861,1	66	
R&D Jobs created	0		0	600		0
Number of technology oriented start-	0					0

ups						
Cooperation projects (private sector – research facilities)	0	22	0	136	25	13

Furthermore, the progress is described predominantly on the priority axis or group of interventions levels, so that concrete results and effects of single programmes can not easily be isolated. This is problematic, as we try to separate the effects of the policy areas or types of instruments.

There are not many examples and illustrative projects in the reports. Information like the following is the exception: In Sachsen-Anhalt so called “transfer broker“ offer services to SMEs and support SMEs in organising their innovation processes through technical-scientific advice. The assessment of the results will take the development of cooperation with research institutes into account.

### ***Innovation Friendly Environment***

Innovation friendly environment is the least important policy area in terms of allocation of funds. The following policy initiatives are funded<sup>9</sup>: Developing financial instruments for technology oriented enterprises (in 3 of the 6 convergence programmes). A group of initiatives deals with e-applications, either for enterprises (e-learning, e-knowledge, e-commerce in 3 OPs) or public services to support enterprises (e-government in 3 OPs). Training courses supporting innovation are only part of the strategy in the OP of Lüneburg/Niedersachsen. One other programme links investment in infrastructure in training and education to innovation

By the end of 2008 nearly one third of the Funds planned for innovation financing had been approved (Bundesministerium für Wirtschaft und Technologie 2009), which is the highest rate of all policy areas. As a consequence, progress of financial implementation appears satisfactory. This, however, is partly due to rules of the Fund instruments, whereby the amount paid into the fund can be booked as an actual expenditure.

For this policy area only very limited reliable information on effects and results is available. In the update of the mid-term evaluation in Saxony, the support for e-government and e-business is seen as complementing the development of communication infrastructure by developing services. It has effects on networking of enterprises and innovation processes (Schwab et al. 2005:32f.)

### ***Knowledge Transfer and support to Innovation Poles and Clusters***

Given the comparatively weak private R&D activities in most of the Convergence Länder, transfer, poles and clusters are important elements of nearly all Länder strategies: All except one programme (5 out of 6) explicitly support network and cluster management initiatives. Infrastructural elements of the transfer system are support in 3 of the 6 Ops by funding incubator or technology centres. Transfer via heads is funded in form of programmes for the employment of graduates in

<sup>9</sup> See Annex H.

enterprises (innovation assistants). One programme emphasises the transfer aspect of cooperation projects, whilst cooperation projects normally are subsumed under the policy “boosting R&D”.

Financially speaking, 11% of the budget had been approved by end 2008 (Bundesministerium für Wirtschaft und Technologie 2009).

A recent study summarises ERDF funding achievements in the German convergence regions (GEFRA Gesellschaft für Finanz- und Regionalanalysen et al. 2010). As valid information from indicators of the monitoring systems is missing, the analysis is based on literature review and draws conclusions on achievements.

The study, focussing on methods to support cooperation, produces evidence of positive effects of cooperative projects on impact of R&D activities in enterprises (GEFRA Gesellschaft für Finanz- und Regionalanalysen et al. 2010:171f.). Intensified cooperation between SMEs and universities/research institutes helps to make better and more efficient use of R&D capacities in the private sector. Supporting services helps to stabilise the innovation processes in enterprises.

The update of the mid-term evaluation in Sachsen refers to other studies to emphasise the importance of networking and cooperation for innovation: R&D success is higher when enterprises are part of a network. This leads to better results in terms of competitiveness and employment (Schwab et al. 2005:28).

Another study analyses independently from ERDF-participation the network strategy in Sachsen (Ossenkopf et al. 2004). The comprehensive approach of the network strategy consists in a number of different instruments including support to cooperation development, joint research projects, network initiatives, etc. With this broad scope, the study goes beyond innovation networks and also covers others like marketing or production networks. The study compares networks that receive public funds with those cooperating without public support. A number of differences between the two types is identified: small enterprises are better represented in networks with public funding. The same is true for weaker enterprises with a less favourable economic development. One result of the study is that the weaker enterprises cooperate successfully and achieve a better market position. Comparing the networking results, the networks with public funding perform better in increasing R&D activities and creating jobs,

Subject of another recent study is the policy to support technology transfer in Saxony (Bötzel et al. 2008). The instrument targets SME and offers support for the acquisition of technology/Knowledge from research organisations. The study is rather a needs-assessment based on a survey of enterprises. The result is that even taking in account the existing federal instruments for the support of transfer, there is a need for this kind of policy.

### ***Boosting applied Research and Product Development***

As one of the backbones of the innovation policy elements in convergence programmes, the following initiatives are co-financed to boost applied research: Addressing enterprises, grant

schemes for R&D projects want to support development of new products, services and processes. A second initiative found in all programmes is targeted support for application oriented R&D infrastructures at universities and research institutions (3 out of 6 programmes), application oriented R&D projects of universities and research institutes are also funded. Supporting innovative start ups, often linked to support for spin-offs from universities, is another element (3 of 6 programmes).

Nearly one quarter of the funds was already approved by end of 2008.

To draw conclusions on direct support for R&D in enterprises, a number of micro-economic studies have been analysed (GEFRA Gesellschaft für Finanz- und Regionalanalysen et al. 2010:169f.). A first result is that a significant amount of additional R&D-activities can be induced by funding R&D projects. Especially in the Convergence regions, windfall gains are rather small.

Based on an analysis of monitoring data and discussing the output in the light of the literature, the mid-term evaluation for Thüringen expects an improvement of the innovation capacity of enterprises resulting from direct support for R&D (Untiedt et al. 2003:143).

The update of the mid-term evaluation of 2000–2006 in Mecklenburg–Vorpommern includes an analysis of the results of support for R&D-infrastructure. Besides funding for a number of R&D projects, the investment in research equipment of the Max–Planck–Institute for plasma physics for research in nuclear fusion is contributing to the development of the research potential in the region (Bornemann und Koch 2005:82). All in all, 439 new R&D-jobs were created in connection to the infrastructure support. The assessment of the R&D-projects in enterprises, which have led to development of economic potential and creation of jobs (Bornemann und Koch 2005:83), has been very positive.

The update of the midterm evaluation 2000–2006 in Sachsen underlines that R&D-support contributes significantly to the improvement of innovation potential and competitiveness of enterprises (Schwab et al. 2005:28). Support of R&D infrastructure is evaluated as successful: a high number of spin-offs is contributing to knowledge transfer (Schwab et al. 2005:29).

An evaluation of the policy to support joint research projects was carried out in Thüringen in 2004/2005 independent from ERDF-Funding (Untiedt et al. 2005). Based on a literature review, a survey of beneficiaries and case studies, the programme is evaluated as successful. In many projects, cooperation will most likely continue, research networks have been strengthened. The technical objectives of the projects have been achieved to a large extent and the enterprises will continue to invest in innovation. For the participating enterprises, a number of patent applications, licence revenue, and above-average growth in turnover and employment have been recorded. The participating universities report an above-average number of spin-offs; the continuation of this kind of support is recommended.

### ***General Outcome and Result of innovation Policy in the Convergence Regions***

As systematic information on the result and impact of support to innovation in the Convergence regions cannot be gathered from annual reports etc. We present some information from a study on the R&D potential in the private sector (Konzack et al. 2009). As ERDF is 1) contributing significantly to Länder funding and 2) is used to finance the relevant instruments, the following results include the effects of ERDF funding:

- In 2008, 88% of the enterprises systematically engaged in R&D were using programmes for R&D support. 35% participated in networking and cluster programmes, 9% in advisory services and 13% in technology transfer programmes. For the enterprises, R&D project support is by far the most important.
- Public funding amounts to nearly 40% of the R&D expenditure of small enterprises (up to 9 employees), and benefits 33% of the enterprises with less than 249 employees, whereas only 10% of large enterprises benefit of the intervention.
- In the 2000 to 2006 period all in all 6.592 new jobs were created due to R&D funding in the convergence regions, of those 2.547 were R&D jobs.
- The amount of public funding per job created was 126 thousand €, and per R&D job 346 thousand .
- From the perspective of the enterprises, the main effect of R&D support is market expansion ( 75% of the enterprises funded), nearly as important as the increase in turnover. Employment growth (54%) and cost reduction (23%) is less important.

These figures substantiate a significant effect of R&D funding in the private sector. Although they refer to the whole of Federal, Länder, and EU-funding in the convergence regions, one can justifiably argue that ERDF- significantly contributed to these results.

Another study analysing the innovation policy in the new Länder found that innovation policy contributed positively to structural adjustment (Koschatzky et al. 2005:108f.). Given the different regional potentials and starting situations, a variety of approaches to innovation should be followed in the different Länder. Network approaches are essential to support regional initiatives. Furthermore, it is necessary, to support the phases of innovation application and marketing to complete the value chain of the process. The success of transfer activities depends closely on the research institutes – transfer from the existing structures is not a viable approach in every region. Targeted infrastructure support can be an important complementary element of a strategy.

### **3.2 ACHIEVEMENTS UNDER THE COMPETITIVENESS OBJECTIVE**

The Operational Programmes of the Competitiveness regions are less uniform than those of the Convergence regions. Six types of policy initiatives can be identified that are more or less common in the programmes: 1) Network and Cluster 2) Start ups and spin-offs 3) Competence and transfer centres 4) R&D projects in enterprises 5) cooperation projects 6) R&D infrastructure of universities



and research institutes. Depending on the needs of the respective land, there are different combinations of these core instruments and varying complementary elements of the strategy.

The Competitiveness programmes emphasise the policy areas “Knowledge transfer and support to innovation poles and clusters” and “Boosting applied research and product development”.

	Innovation friendly environment					Knowledge transfer and support to innovation poles and clusters				Boosting applied research and product development				
	Financing instruments for technology oriented enterprises	E-learning and E-knowledge	Infrastructure for spatial data	Development of E-Government	Education and Training, Consultancy	Network and Cluster management	Transfer “via heads” – Innovation assistant	Incubator Centres/Technology Centres/Competence Centres	Transfer by cooperation projects	R&D projects in enterprises	R&D-Projects for specific fields of technology	Supporting start-ups	R&D Infrastructure (Universities and research organisations)	Economy oriented R&D projects of research organisations
OP Baden-Württemberg						X		X	X	X	X	X	X	X
OP Bayern	X				X	X		X			X	X	X	
OP Berlin	X		X			X				X		X	X	
OP Bremen		X				X		X	X	X		X	X	
OP Hamburg						X					X	X		
OP Hessen		X				X	X		X	X				X
OP Niedersachsen	X					X	X	X	X	X		X		
OP Nordrhein-Westfalen	X					X		X		X	X	X	X	
OP Rheinland-Pfalz	X				X	X		X	X	X		X	X	
OP Saarland				X	X		X	X	X				X	X
OP Schleswig-Holstein					X	X	X	X	X	X		X	X	
Total (Number of Ops with the respective type of instruments)	5	2	1	1	4	10	4	8	7	8	4	9	8	3

The annual reports are not a rich source of information on funding outcomes and results. The gathering of quantified information was not coordinated, which makes it difficult to collect data across Länder. Furthermore, data collecting methods differ: Some Länder count all approved projects, others only finished ones. The following therefore combines different qualities of information (plan data vs. actual data). Only a selection of core indicators included in several programmes is presented.

	OP Baden-Württemberg	OP Bayern	OP Berlin	OP Bremen	OP Hamburg	OP Hessen	OP Niedersachsen	OP Nordrhein-Westfalen	OP Rheinland-Pfalz	OP Saarland	OP Schleswig-Holstein
Investment in R&D (Mio. €)	0		58,9	0,99							0
R&D Jobs created				0			24		0		0

Number of technology oriented start-ups							32		0		
Cooperation projects (private sector – research facilities)	0	4	7	6		12	92	19	2	1	0

### ***Innovation Friendly Environment***

As in the Convergence regions, this policy area is the least important in terms of financial allocation – but the share is significantly higher in competitiveness regions (17,6 %). The 11 competitiveness objectives have few instruments in common, but the most frequent approaches are: financing instruments for innovation (funds, equity, etc.) in (5/11 programmes), education and training, consultancy for innovation projects (4/11). Given the low relevance of this policy area, the backbone of the Länder innovation strategies consists of activities in the other two policy fields.

By end of 2008 47 % of Funds had been approved.

As part of the broader support for start-ups, 87 technology-oriented start ups or spin-offs have been funded (Bornemann, Rautenberg, Winter, et al. 2010:81); the aim is to achieve 4.850 technology-oriented start-ups by the end of the funding period.

### ***Knowledge Transfer and support to Innovation Poles and Clusters***

This policy area has a weight of 46 % of the financial resources. The main initiatives are: networking and cluster development (10/11 programmes), technology/competence centres (8/11), transfer by cooperation projects (7/11).

Interventions to support transfer of people (innovation assistants) are only implemented in four programmes. 22 % of the funds had been approved by end 2008.

In Germany, 8,4% of the ERDF-competitiveness budget is devoted to transfer infrastructures and 31,1% of this amount has already been approved (Bornemann, Rautenberg, Winter, et al. 2010:54). The projects include transfer centres, technological advice, thematic innovation centres, etc.

The study of Prognos (Bornemann, Rautenberg, Winter, et al. 2010:57f) estimates that some 100 networks and cluster will be supported over the funding period – by the end of 2008 56 networks and cluster projects had already been approved.

Examples:

- The programme of Badenwürttemberg supports so called centres for applied research at universities of applied research. Four centres were established in 2008. Research with high innovation potential is carried out in cooperation with SMEs and other research facilities. The four centres are “Centre for Computational Materials Science and Engineering”, “Autonomous mobile service robots”, “Photonic methods in new dimensions”, and “Model-based development and realisation patterns for embedded systems”

- In Hessen, a first Cluster Competition has been carried out and led to the selection of 15 cluster initiatives. The competition procedure alone involved 2.600 actors.
- A number of cluster and networking initiatives and competitions is being funded in Nordrhein–Westfalen. Specific thematic competitions (e.g. energy.nrw, automotive.nrw) have been initiated.

Concerning the funding of transfer infrastructure (transfer centres) in Nordrhein–Westfalen, the update of the mid–term evaluation arrives at mixed conclusions (Ridder et al. 2005:91f.). Generally speaking the projects have a good quality, but it is uncertain to what extent they will be used. The evaluation raises the question whether funding should put a stronger emphasis on the networking role of innovation centres instead of considering them primarily as providers of infrastructure. They could play an active role in networking and cooperation.

The update of the mid–term evaluation of Rheinland–Pfalz analyses in a case study approach the effects of support for R&D infrastructure. Although different effect patterns can be distinguished, the funding of R&D infrastructure stimulates knowledge transfer in different fields. A specific approach – the so called “research labs” is highlighted as good practice. Research labs are an open research platform offering the opportunity to develop further cooperation and form a nucleus for a cluster (Franz et al. 2005:69ff.)

### ***Boosting applied Research and Product Development***

Finally the third policy area has a relative weight of 35 % of ERDF funds. The main initiatives are: Supporting start–ups (9/11), R&D–projects in enterprises (8/11), R&D infrastructure (7/11)

R&D projects in specific fields (environment, regenerative energies) are comparatively rare, as are R&D projects in infrastructures.

21 % of the overall ERDF–budget under the competitiveness objective are foreseen for the support of R&D infrastructure (Bornemann, Rautenberg, Winter, et al. 2010:50), by the end of 2008, 23,7 % of this amount had been approved. A recent study (Bornemann, Rautenberg, Winter, et al. 2010:51 ff.) estimates the effects of R&D infrastructure support in the competitiveness regions. Over the funding period, support for 254 research institutes and universities is expected. 56 projects of this kind had already been approved by end of 2008, so the target will probably be reached. A total of 2.200 joint research projects will be funded. Prognos estimates that this will lead to 5.000 R&D jobs created – or even 20.000 including spill–over effects.

Examples:

- In Niedersachsen 92 cooperation projects had been initiated by the end of 2008, which is nearly one third of the 300 projects planned. 77 R&D–jobs created are directly linked to these projects.

The update of the mid-term evaluation in Nordrhein-Westfalen uses a survey of fund receiving enterprises. It concludes that the funding successfully increased R&D capacity in the participating enterprises and gives hints for effective knowledge transfer. But it does not identify clear advantages of a competitive selection procedure (Ridder et al. 2005:51).

### ***Additional aspects***

A feature common to competitiveness programmes is, that nearly all programmes complement the standard-type interventions with more innovative and explorative approaches. Bremen's broad approach, for instance, emphasises awareness raising for R&D and innovation, using key projects, innovation marketing, innovation knowledge management, etc. Hamburg extends the support for enterprises by using consultancy and instruments to support market integration. Nordrhein-Westfalen finances innovation vouchers for enterprises and emphasises innovation in services. Berlin recognises the potential of the cultural and creative industries and implements some atypical instruments in this field. Several Länder try to find new approaches by experimenting.

So, the strategies of the competitiveness Länder on the one hand reflect the different socio-economic situations and mainly the different starting situations in the innovation systems, but they also illustrate that the inbuilt mechanism of competition in a federal system can lead to a variation of promising and partly innovative approaches.

A recent study in the Land of Bremen analyses the effects of ERDF-funding for the regional innovation system (Bornemann, Rautenberg, und Breuer 2010). Whilst studies on the result and effect of financial support often look at instruments separately, this study tries to comprehend the effect of the whole range of ERFD-funding on the regional innovation system. Focusing on the innovation system allows the assessment of the relative importance of different bottle-necks. The results and effects can thus be interpreted in a broader context. The study covers the period from 2000 to 2007 and all relevant ERDF-funded projects in this time span. Three thematic fields are analysed: materials research, energy research, biotechnology. One of the lessons is that not only the classical R&D-type of interventions can be effective in supporting cluster development. For instance, the cluster of energy technology with a focus on off-shore wind energy had to tackle the problem of specific wharfage for the large prefabricated parts of these constructions. In this case, a piece of traditional infrastructure helped to overcome a serious bottleneck. The success-factors identified include a strategic approach, clear focus, continuous support, effective transfer structures, close and broad networks, etc. The main lesson is, that successful development requires strategic management and cooperation on a level "above" single instruments.

The update of the mid-term evaluation in Nordrhein-Westfalen complements the evaluation of single instruments by assessing the policy mix. The general trend is to focus innovation policy not so much on single incentives, but on the performance of the regional innovation system. The evaluation suggests a further differentiation of the policy-mix to target all relevant aspects (Ridder et al. 2005:112ff.)

### 3.3 ON EMPLOYMENT EFFECTS OF R&D POLICY

To illustrate the kind of evidence available from research on effects of R&D- and innovation policy, results of two studies will be summarised; a huge number of similar studies is available – some with different results and conclusions. So the studies only represent one opinion in the scientific debate.

Based on a comparatively demanding database from different panel studies and a matching approach, Czarnitzki and Licht analyse the effects of innovation policy on the catching up process in Eastern Germany (2004). Firstly, they report a selection effect: funded enterprises are larger, often have an R&D unit, and have a higher chance of holding patents. Funding stimulates additional innovation input (in terms of money). The treatment effect is higher for East Germany than for West Germany. This suggests that the share of enterprises that does not invest in R&D without public support is higher in Eastern Germany. Public support increases the probability for patent applications. All in all, R&D funding helped to intensify industrial R&D. By doing so, more new products could be developed and brought to market.

Based on model calculations, Rammer and Peters analyse the employment effect of innovation (Rammer und Peters 2010). Firstly successful innovation – in form of new products – is significantly linked to positive development of turnover. Process innovation on the other hand has neutral and in some phases of the business cycle negative effects on turnover. The employment effect of new products is on the same level as the employment effects of old products – in phases of strong growth. They are weaker than employment effects of old products in phases of weak growth. For services, there is no link between the phases of the business cycle and the employment effects of additional turnover. Net growth in employment on enterprise level is caused by innovation activities. For industries, this is only comes from product innovation – process innovation is even slightly negative in terms of employment (due to the contribution to productivity growth). In services, the effect of process innovation on employment is positive in most phases.

There is a large number of empirical studies on different aspects of results and effects of innovation and R&D policies. In many cases, the methodology of these studies is better than the methods applied in evaluations. Therefore, it would make sense to collect this information in a more systematic way than can be done here.

## 4 CONCLUSION: MAIN CHALLENGES FACED BY COHESION POLICY PROGRAMMES

As to the main challenges in the future, different perspectives can be discussed.

- With a view to the debate about the future cohesion policy: The profile of ERDF funding in Germany highlights that an innovation oriented regional economic development strategy produces value added. Its effects strengthen transfer and R&D in enterprises. The element

of a multi-annual strategic approach at the interface between research and the private sector seems to be inevitable for the development of effective innovation systems. This strategy is essential for the regional development.

- As the general gap in terms of infrastructure and research institutes in East Germany has more or less closed, the challenge now for the whole of Germany is to continue R&D policy by carefully choosing an adequate policy mix integrating R&D infrastructure and transfer policies – it is also important to embed typical R&D-instruments in a coherent regional development strategy. The instruments and strategies of the Länder seem too uniform and not sufficiently tuned to the specific needs of the individual Länder.
- Recently impulses to develop innovative services and exploit the potential of creative industries have become more important. The relevance of “innovation” in a knowledge based and service dominated society needs to be explored further. New instruments to support innovation in services need to be developed. The growing impact of services in the traditional industries is a relevant aspect in this respect. The conditions of innovation and creativity in different regional territorial patterns – from metropolis to rural areas – need to be better integrated in the innovation strategies.
- Finally, the competitiveness Länder show that the regional approaches offer a potential for experiment and learning. In conclusion, the general assessment is that a regionalised approach integrating innovation policy in an overall regional development strategy is more effective for development and the innovation system as a whole – if it is properly adjusted to the regional needs and integrated in a comprehensive strategy.

## METHODS AND INTERVIEWS

The core of this paper is based on a systematic review of all Operational Programmes and the Annual Reports 2008 (see the separate annex where the compilation of information is documented).

The draft of the report and the tables assigning the instruments to the programmes have been sent to all MAs for comments. Comments have been taken up.

Interviews to check and collect information have been undertaken with the coordinating unit in the Federal Ministry of economics and with the Author of the national strategic report – who works in one of the most prominent institutes for evaluation of R&D policy in Germany

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For the Ops and annual reports used see annexes H and I

## ANNEX A – BACKGROUND DATA ON EU COHESION POLICY SUPPORT TO INNOVATION

The data on the ERDF resources allocated cover the FOI codes defined as being relevant for support of RTDI, or, more precisely, those that cover the bulk of resources devoted to innovation (see annex B for the list of codes).

**Table 1 – Total ERDF resources allocated per programme (2007–2013)**

GERMANY				
Programme	Total ERDF resources for innovation	Total ERDF	Innovation support as % of total ERDF	Main initiatives implemented
Operationelles Programm EFRE Thüringen 2007 bis 2013	428.600.000	1.477.687.909	29,0%	All programmes R&D projects in enterprises R&D Infrastructure (universities and Research institutes)
Operationelles Programm EFRE Brandenburg 2007–2013	541.200.000	1.498.732.588	36,1%	
Operationelles Programm EFRE 2007 – 2013 Mecklenburg-Vorpommern	327.899.000	1.252.420.390	26,2%	Most Programmes Network and Cluster management (5) R&D projects in specific fields (5)
Operationelles Programm EFRE Sachsen 2007–2013	1.091.697.143	3.091.139.706	35,3%	
Operationelles Programm Verkehr EFRE Bund 2007–2013		1.520.319.639	0,0%	Some programmes New financing instruments (3) E-Government (3) Incubators/technology Centres (3) Start-ups (3) R&D-projects in research organisations (3)
Operationelles Programm EFRE Niedersachsen – Region Lüneburg 2007–2013	174.030.000	589.000.000	29,5%	
Operationelles Programm EFRE Sachsen-Anhalt 2007–2013	580.276.953	1.931.792.253	30,0%	For objective 2, the same core set of approaches as in objective one applies with the following specifications: – infrastructure is less important than in objective 1 – There is more variation in the composition of instruments – Special approaches are more frequent (training, interregional exchange)
<b>Total Objective 1</b>	<b>3.143.703.096</b>	<b>11.361.092.485</b>	<b>27,7%</b>	
Operationelles Programm EFRE Bayern 2007 – 2013	166.074.068	575.934.188	28,8%	
Operationelles Programm EFRE Saarland 2007 – 2013	78.579.000	197.512.437	39,8%	
Operationelles Programm EFRE Schleswig-Holstein 2007–2013	122.135.000	373.888.769	32,7%	
Operationelles Programm EFRE Berlin 2007–2013	358.064.010	875.589.810	40,9%	
Operationelles Programm EFRE Hessen 2007–2013	94.084.159	263.454.159	35,7%	
Operationelles Programm EFRE Bremen 2007 – 2013	80.200.000	142.006.631	56,5%	
Operationelles Programm EFRE Nordrhein-Westfalen 2007–2013	494.582.727	1.283.430.816	38,5%	
Operationelles Programm EFRE Baden-Württemberg 2007–	81.800.000	143.400.068	57,0%	

2013				- Experimentation is more common
Operationelles Programm EFRE Hamburg 2007–2013	23.782.000	35.268.791	67,4%	
Operationelles Programm EFRE Niedersachsen (ohne Region Lüneburg) 2007–2013	256.747.113	638.769.613	40,2%	
Operationelles Programm EFRE Rheinland–Pfalz 2007–2013	97.375.000	217.613.760	44,7%	
<b>Total Objective 2</b>	<b>1.853.423.077</b>	<b>4.746.869.042</b>	<b>39,0%</b>	
<b>Overall total</b>	<b>4.997.126.173</b>	<b>16.107.961.527</b>	<b>31,0%</b>	<b>To be completed by the expert</b>

Source: core team on EC data.

**Table 2 – ERDF contribution to innovation by policy area (2007–2013)**

Policy Area	Categorisation of Expenditure (FOI codes)	Total ERDF
<b>Objective 1</b>		
Assistance to SMEs for the promotion of environmentally–friendly products and production processes (...)	06	70.196.419
Investment in firms directly linked to research and innovation (...)	07	156.983.599
Other measures to stimulate research and innovation and entrepreneurship in SMEs	09	335.305.076
R&TD activities in research centres	01	187.455.197
<b>Boosting applied research Total</b>		<b>749.940.291</b>
Advanced support services for firms and groups of firms	05	131.628.028
Developing human potential in the field of research and innovation, in particular through post–graduate studies ...	74	
Information and communication technologies (...)	11	111.276.779
Information and communication technologies (TEN–ICT)	12	
Other measures for improving access to and efficient use of ICT by SMEs	15	
Services and applications for citizens (e–health, e–government, e–learning, e–inclusion, etc.)	13	39.073.300
Services and applications for SMEs (e–commerce, education and training, networking, etc.)	14	51.314.155
<b>Innovation friendly environment Total</b>		<b>333.292.262</b>
Assistance to R&TD, particularly in SMEs (including access to R&TD services in research centres)	04	759.105.466
R&TD infrastructure and centres of competence in a specific technology	02	978.559.450
Technology transfer and improvement of cooperation networks ...	03	322.805.627
<b>Knowledge transfers and poles Total</b>		<b>2.060.470.543</b>
<b>Total Objective 1</b>		<b>3.143.703.096</b>
<b>Objective 2</b>		
Assistance to SMEs for the promotion of environmentally–friendly products and production processes (...)	06	53.665.013
Investment in firms directly linked to research and innovation (...)	07	187.057.530
Other measures to stimulate research and innovation and entrepreneurship in SMEs	09	184.790.346
R&TD activities in research centres	01	237.708.295
<b>Boosting applied research Total</b>		<b>663.221.184</b>
Advanced support services for firms and groups of firms	05	197.620.651
Developing human potential in the field of research and innovation, in particular through post–graduate studies ...	74	10.590.000
Information and communication technologies (...)	11	49.020.606
Information and communication technologies (TEN–ICT)	12	3.694.000
Other measures for improving access to and efficient use of ICT by SMEs	15	4.530.000
Services and applications for citizens (e–health, e–government, e–learning, e–inclusion, etc.)	13	28.675.600
Services and applications for SMEs (e–commerce, education and training, networking, etc.)	14	32.574.363

<b>Innovation friendly environment Total</b>		<b>326.705.220</b>
Assistance to R&TD, particularly in SMEs (including access to R&TD services in research centres)	04	167.508.700
R&TD infrastructure and centres of competence in a specific technology	02	313.136.549
Technology transfer and improvement of cooperation networks ...	03	382.851.424
<b>Knowledge transfers and poles Total</b>		<b>863.496.673</b>
<b>Total Objective 2</b>		<b>1.853.423.077</b>

Source: core team on EC data.

## ANNEX B – CLASSIFICATION OF INNOVATION POLICY AREAS, INSTRUMENTS AND BENEFICIARIES

Policy area	Short description
Innovation friendly environment	<p>This category covers a range of actions which seek to improve the overall environment in which enterprises innovate, and notably three sub groups:</p> <ul style="list-style-type: none"> <li>• innovation financing (in terms of establishing financial engineering schemes, etc.);</li> <li>• regulatory improvements and innovative approaches to public services and procurement (this category could notably capture certain e-government investments related to provision of services to enterprises);</li> <li>• Developing human capital for the knowledge economy. This category will be limited to projects in higher education aimed at developing industry orientated courses and post-graduate courses; training of researchers in enterprises or research centres.</li> </ul> <p>The category also covers initiatives geared towards improving governance capacities for innovation and knowledge policies (e.g. specific technical assistance funding, support for regional foresight)</p>
Knowledge transfer and support to innovation poles and clusters	<p>Direct or indirect support for knowledge and technology transfer:</p> <ul style="list-style-type: none"> <li>• direct support: aid scheme for utilising technology-related services or for implementing technology transfer projects, notably environmentally friendly technologies and ITC;</li> <li>• indirect support: delivered through funding of infrastructure and services of technology parks, innovation centres, university liaison and transfer offices, etc.</li> </ul> <p>Direct or indirect support for creation of poles (involving public and non-profit organisations as well as enterprises) and clusters of companies</p> <ul style="list-style-type: none"> <li>• direct support: funding for enterprise level cluster activities, etc.</li> <li>• indirect support through funding for regrouping R&amp;D infrastructure in poles, infrastructure for clusters, etc.</li> </ul>

Boosting applied re- search and product development	<p>Funding of “Pre-competitive development” and “Industrial research” projects and related infrastructure. Policy instruments include:</p> <ul style="list-style-type: none"> <li>• aid schemes for single beneficiary or groups of beneficiaries (including IPR protection and exploitation);</li> <li>• research infrastructures for non-profit/public organisations and higher education sector directly related to universities.</li> </ul> <p>Any direct or indirect support for the creation of innovative enterprises (spin-offs and start-ups)</p>
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<b>Instruments</b>	<b>Short description</b>
Infrastructures and fa- cilities	<p>Building and equipment for laboratories or facilities for university or research centres, Telecommunication infrastructures, Building and equipment for incubators and parks for innovative enterprises</p>
Aid schemes	<p>Grants and loans for RTDI projects Innovative finance (venture capital, equity finance, special bonds, etc.) for innovative enterprises</p>
Education and training	<p>Graduate and post-graduate University courses Training of researchers</p>

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

## ANNEX C – CATEGORISATION OF EXPENDITURE TO BE USED FOR CALCULATING EU COHESION POLICY RESOURCES DEVOTED TO INNOVATION

FOI Code	Priority Theme
	<b>Research and technological development (RTD), innovation and entrepreneurship</b>
01	R&TD activities in research centres
02	R&TD infrastructure (including physical plant, instrumentation and high-speed computer networks linking research centres) and centres of competence in a specific technology
03	Technology transfer and improvement of cooperation networks between small businesses (SMEs), between these and other businesses and universities, postsecondary education establishments of all kinds, regional authorities, research centres and scientific and technological poles (scientific and technological parks, technopoles, etc.)
04	Assistance to R&TD, particularly in SMEs (including access to R&TD services in research centres)
05	Advanced support services for firms and groups of firms
06	Assistance to SMEs for the promotion of environmentally-friendly products and production processes (introduction of effective environment managing system, adoption and use of pollution prevention technologies, integration of clean technologies into firm production)
07	Investment in firms directly linked to research and innovation (innovative technologies, establishment of new firms by universities, existing R&TD centres and firms, etc.)
09	Other measures to stimulate research and innovation and entrepreneurship in SMEs
	<b>Information society</b>
11	Information and communication technologies (access, security, interoperability, risk-prevention, research, innovation, e-content, etc.)
12	Information and communication technologies (TEN-ICT)
13	Services and applications for the citizen (e-health, e-government, e-learning, e-inclusion, etc.)
14	Services and applications for SMEs (e-commerce, education and training, networking, etc.)
15	Other measures for improving access to and efficient use of ICT by SMEs
	<b>Human capital</b>
74	Developing human potential in the field of research and innovation, in particular through post-graduate studies and training of researchers, and networking activities between universities, research centres and businesses