

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

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CONTENTS

Executive Summary	i
1 Introduction	1
2 Investing in innovation and knowledge: a comparative overview of regional performance	3
2.1 Country overview: innovation and the knowledge economy	3
2.2 Regional disparities and recent trends	6
2.3 Conclusions: innovation and knowledge performance	11
3 Innovation and knowledge: institutional context and policy mix at national and regional levels	12
3.1 Institutional and legal framework for innovation and the knowledge economy	12
3.2 Policy mix assessment	15
3.3 Conclusions: the national innovation system and policy mix	19
4 Structural Funds interventions to boost innovation and create a knowledge economy: 2000-2006	21
4.1 Strategic framework for Structural Fund support to innovation and knowledge	21
4.1.1 Strategic approach to innovation & knowledge in Structural Fund programmes	21
4.1.2 Specific measures in favour of innovation and knowledge	26
4.2 Learning from experience: the Structural Funds and innovation since 2000	29
4.2.1 Management and coordination of innovation & knowledge measures	29
4.2.2 Effects and added value of Structural Fund support for innovation and knowledge	32
4.3 Conclusions: Structural Funds interventions in favour of innovation and knowledge	35
5 Regional potential for innovation: a prospective analysis	37
5.1 Factors influencing regional innovation potential	37
5.2 A prospective SWOT appraisal of regional innovation potential	39
5.3 Conclusions: regional innovation potential	41
6 Future priorities for Structural Fund support for innovation and knowledge: options for intervention	44
6.1 Strategic orientations for Structural Fund investments in innovation and knowledge	47
6.2 Operational guidelines to maximising effectiveness of Structural Fund interventions for innovation and knowledge	50

Executive Summary

In spite of some advances in recent decades, Portugal is still lagging behind the EU-25 average for most knowledge economy indicators. Portugal scores above the EU average on four items only (unemployment, GDP per capita growth, percentage of value-added in agriculture, and female activity rate), being very close to such average on population density, value-added in industry and value-added in services. The picture provided is very consistent with the 2005 European Innovation Scoreboard. Portugal has clear shortcomings on human resources for innovation as well as on R&D expenditures, especially on business sector R&D. The shares of both knowledge workers and S&T workers in total population are significantly below EU average. Over the last six years, a period broadly corresponding to the Third Community Support Framework (CSF III), Portugal has generally loosed ground in economic performance and competitiveness.

A region-wise approach, following the factorial analysis undertaken (leading to the identification of four factors – public knowledge, urban services, private technology and learning families), shows that all Portuguese regions record negative scores on ‘private technology’. The situation is similar for ‘public technology’, with the exception of the Lisboa region. Therefore, Portuguese regions perform poorly in the two key factors behind the capacity to compete in the knowledge economy. In contrast to this overall picture, several regions perform relatively well in the ‘urban services’ factor, particularly Lisboa and the two Atlantic regions (Madeira and Açores). This is a consequence of the relevance of tertiary employment in private services and/or in the public administration sector. The Atlantic regions also perform relatively well on the ‘learning families’ factor. Generally speaking, Alentejo is the region which is doing less well.

The analysis carried out enabled the identification of an agenda of priorities for the seven Portuguese regions. Four of these (Algarve, Alentejo, Açores and Madeira) have less than one million population. Algarve and Madeira have a very specialised economic basis, dependent on the tourism industry. The challenges ahead concern the strengthening of regional knowledge infrastructures to help the specialisation sectors to move towards upper value added market segments. For Alentejo and Açores, innovative strategies need to be pursued to leverage endogenous strengths associated with natural resources and environmental conditions, in connection with a needed improvement in human capital. The promotion of structural change should be the priority for the Norte and Centro regions. The encouragement of new knowledge- and technology-intensive activities will be critical to drive productivity levels upwards. Finally, for the Lisbon region, the knowledge-intensive services suppliers should be helped to increase their market shares, both in other regions and international markets.

Traditionally, the institutional and legal framework for innovation in Portugal has been characterised by two key features: (1) a centralisation of institutions and policies; and (2) a divide between research and enterprise policies. Such a divide has been translated into the structure of the Operational Programmes (OPs) under the successive CSFs. Decisions taken recently concerning the next round of Structural Funds support suggest that this situation will change, with a significant reduction in the number of OPs and a better governance structure.

The policy mix for innovation and knowledge has been mostly focussed on the creation of an innovation friendly environment for firms. This policy area has concentrated a wide number of measures and a significant share of funds allocated to innovation policy. In fact, most of the financial efforts related to innovation policy have been associated with Structural Funds support, namely in the context of two programmes; POE/PRIME, addressed to the modernisation of the economy, and focussed on enterprise policy; and POCTI/POCI 2010, mostly concerned with science and research policy. While the Structural Funds support to RTDI has had a positive effect in terms of promoting R&D activities in Portugal, the fact that a global vision with respect to innovation and knowledge has been lacking has hindered the possibility of an appropriate structural adjustment.

In what concerns innovation and knowledge, the CSF III was not successful in bringing about the required structural change. Despite a wide portfolio of measures, practice has shown that the implementation of many of them was limited by demand shortcomings. This led to a concentration of resources on more conservative measures, which have an easier implementation. The problem was compounded with the above mentioned lack of a systemic view on the policy-making side. The concentration of the new National Strategic Reference Framework (NSRF) on three sectoral OPs (together with the regional ones) and its articulation with the ‘Technological Plan’ (launched in 2005) might be understood as a promise of greater coherence leading to a potential emergence of a systemic approach to innovation policy.

Based on an analysis of the main factors influencing regional innovation policies, a prospective SWOT analysis of regional innovation potential was undertaken. This led to the identification of six policy headlines:

- Stimulate the emergence of new private, knowledge-intensive actors;
- Help existing firms to build up capabilities and move upwards their value-chains
- Active innovation diffusion policy towards SMEs;
- Connect public knowledge supply with the economic and social needs of the regions;
- Create more ‘systemic’ (intra- and inter-regional) connections between the actors;
- Promote life-long learning and improve the quality of the education and training systems.

The analysis undertaken, together with the interactions held in the Focus Group with key stakeholders, enable the identification of a number of key conclusions on what concerns both the strategy and the operationalisation of the interventions under the next NSRF. From a strategic perspective, the main conclusions are the following:

- Stimulate the development of a systemic innovation policy, aimed at fostering connections among the actors in the national innovation system
- Focus on intangible investments and human skills
- Promote structural change through the encouragement to the emergence of new, knowledge-intensive, enterprises
- Promote the modernisation and upgrading of existing companies to strengthen their competitiveness in international markets

From an operational standpoint, the main conclusions are:

- A change in the governance model used in earlier CSFs is badly needed
- A balanced mix of national and regional interventions should be defined
- Invest on more demanding actions, while developing new approaches to stimulate a more qualified demand
- Specific policy measures addressed to the creation and development of networking and cooperation should be granted a significant role
- Stronger effort should be put on innovation support services towards 'contingent' SMEs and new technology based firms.

1 Introduction

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

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

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

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

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

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

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

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

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

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

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

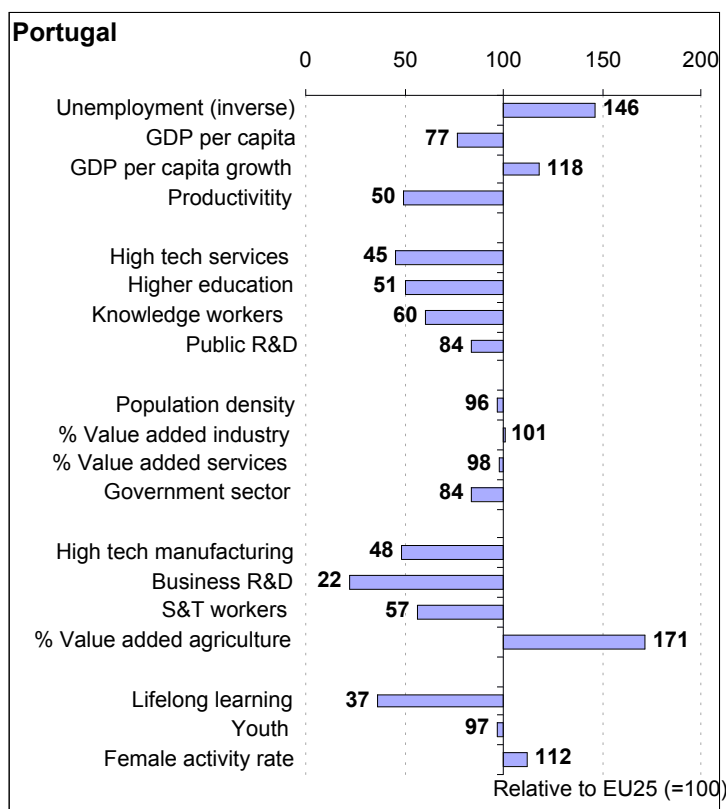
2 Investing in innovation and knowledge: a comparative overview of regional performance

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

2.1 Country overview: innovation and the knowledge economy

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

Exhibit 1: Relative country performance for key knowledge economy indicators



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

A cursory analysis of Exhibit 1 shows that Portugal is lagging behind the EU-25 average on most indicators, particularly on those which are more closely related to the capabilities required to profit from the knowledge economy opportunities. These results are in line with the 2005 European Innovation Scoreboard (EIS)³ data, as well as with the Trend Chart Report on Portugal covering the period 2004-2005⁴. According to Exhibit 1 there were only four indicators in which Portugal scored above EU-25 average (unemployment, GDP per capita growth, percentage of value-added in agriculture and female activity rate), while another three recorded figures very close to EU-25 average (population density, value added in industry and value added in services).

In 2004, the real GDP growth rate was below EU-25 average (1.2 against 2.4 per cent). Available information for 2005 indicates that real GDP growth was 0.3 per cent only, although the most recent quarterly analysis available shows a recovery trend. This poor performance has been a constant since 2001. Portugal has been losing ground with regard to the Union. Similarly, labour productivity has deteriorated as against EU-25 average, falling from 71, for 2001, to slightly above 65 per cent, for 2004. Employment has slightly improved in 2004 (+ 0.1 per cent) after a fall in 2003, but prospects for net job creation are not bright. Portugal's unemployment rate is, however, still below EU-25 average. The employment rate (as a percentage of the 15-64 population) in Portugal for 2004 reached almost 68 per cent, some 3.5 percentage points above EU-25 average, in part due to a higher female activity rate. One of the key weaknesses of the Portuguese economy is the decline in export performance. Very open to foreign trade in goods and services, Portugal has been facing significant difficulties in overcoming globalisation challenges especially in the trade of goods, suffering from a decline in World market shares for most of her traditional export sectors.

Portugal has clear shortcomings on human resources for innovation and also on R&D expenditures. The shares of both knowledge workers and S&T workers are significantly below EU-25 average. This reflects to a large extent the relatively low percentage of population with tertiary education. The supply of new S&T graduates has been consistently growing since 1999, but the growth rate has not been strong enough to significantly improve the performance vis-à-vis EU-25 average. The situation is worse if one concentrates on technical qualifications in the active population overall. The deficit that has traditionally hindered the country in this area has not been opposed by training policies active enough. While for the EU overall the participation in life-long learning per 100 in the population aged 25-64 has been getting close to 10% for Portugal the same indicator has not yet overcome the 5% barrier. Data concerning 2005 shows, however, a recovery. This may be expected to be sustained, having in mind Government objectives in this field.

Turning now to R&D expenditures, the most recent data concern 2003. In this year, total R&D expenditures at current prices amounted to slightly above 1 bln EUR. This corresponds to a decline of 4.3 per cent, when compared to 2001 (in constant prices). The fall in R&D was felt in all performance sectors, especially in GOVERD.

³ Available at: <http://trendchart.cordis.lu/scoreboards/scoreboard2005/index.cfm>.

⁴ Available at: http://trendchart.cordis.lu/tc_country_list.cfm?ID=27.

Against this backdrop, it is important to remark that GOVERD's behaviour is much less negative than that of BERD. While the business R&D expenditures to GDP ratio, for 2003, was 0.26 per cent only, the corresponding ratio for public R&D expenditures was 0.52 per cent. This means that public R&D expenditures are much less far away from Barcelona targets, than are business R&D expenditures. The commitment of Portuguese firms to R&D activities is, in fact, very low. It is partly due to a bias of the industrial fabric towards supplier-dependent sectors, whose R&D investment are low; but it is also associated to a low innovation concern of most firms.

The Government has expressed a strong commitment to increase public and private R&D expenditures during the next three years. The *Technological Plan* and the recently disclosed document *Compromisso com a Ciência* (Commitment with Science) have mentioned the objective of doubling public R&D expenditures, to reach 1 per cent by 2009, thus meeting the Barcelona target. With regard to the business sector R&D, the aim is to achieve a three-fold increase, to approach 0.8 per cent by 2009. This very ambitious objective will not be met without a significant change in dominant company behaviour, a significant increase of in-house company's competencies and the emergence of new, more knowledge and research-intensive firms and projects, both domestic and foreign.

Region-wise, R&D expenditures (and R&D human resources) are heavily concentrated. Around 54 per cent of BERD and 51 per cent of GOVERD were performed in the Lisboa e Vale do Tejo region. It should be acknowledged, however, that there was a strong decline in BERD concentration, since, for 2001, the Lisboa e Vale do Tejo region accounted for 65% of total.

High-tech entrepreneurship in Portugal is relatively weak. In spite of the emergence some start-ups which very successfully betted on international niches, the performance in terms of new technology-based ventures is insufficient. This is the result of a set of educational, cultural and economic factors. The education system somehow favours compliance with norms and discourages entrepreneurial attitudes. The present professorial career status is a further hindrance to the launching of entrepreneurial initiatives by University faculty. With regard to economic factors, two deserve a mention: the size of the domestic market; and the insufficient development and professionalism of venture capital activities in Portugal.

Another weakness mentioned in all the appraisals of the working of the National Innovation System (NIS) in Portugal is the low density of inter-actions among the different actors, including University-Industry linkages⁵. Although the recent launching of the *Technological Plan* is expected to enhance policy coordination and encourage the development of linkages, there is a clear need for strengthening the dialogue and the cooperation among the main players in the NIS in Portugal.

Portuguese firms and Portuguese consumers in general have shown a favourable attitude towards innovation adoption. Programmes implemented within the context of CSF policies have allowed for the modernization of industrial facilities, and many

⁵ See, for instance, the Trend Chart Report, *Annual Innovation Policy Trends and Appraisal Report on Portugal 2004-2005*, 2005, and M.M. Godinho and V.C. Simões, *I&D, Inovação e Empreendedorismo*, Observatório do QCA, Lisboa, 2005.

medium- and larger-size firms use now state-of-art hardware. A similar trend has however been witnessed to a smaller extent in what regards the acquisition of (softer) competitive assets. Firms, particularly those in lower tech sectors, have not been able to develop the proper competencies, namely in design, marketing and supply-chain management, that are needed to enter innovation-based strategies. The number of firms who use R&D as a strategic competitive tool is very small. But even in these cases the lack of complementary competencies seems to hinder their performance.

Portugal still enjoys advantages in some traditional industries, where an image of high quality was built, as it happens in textile house ware and in some types of footwear. Without a migration towards higher value added segments and towards innovative business models, Portuguese traditional industries are increasingly vulnerable, however. In mid-high tech industries, a positive reference should be made to mould-making and the automotive industry. This is, however, strongly dependent of the anchor provided by Volkswagen's AutoEuropa. In high-tech intensive manufacturing and services, several interesting initiatives emerged in information and communication technologies (where Siemens has acted as an important lever) as well as on pharmaceuticals and biotechnology, where some research initiatives have generated successful projects. The majority of Portuguese firms lack, however, the capabilities and scale to strive in global markets.

2.2 Regional disparities and recent trends

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

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

All Portuguese regions have in common negative scores on the 'private technology' factor. Further all of them also have low scores on the 'public knowledge' factor, being Lisbon e Vale do Tejo the only one performing above the EU average on this regard. This situation denotes a weak performance of all Portuguese regions in the two factors that have more to do with the capacity to compete in the 'knowledge economy'. In contrast to this overall picture, several regions perform relatively well in the 'urban services' factor. This is particularly the case of Lisboa and the two Atlantic regions, Madeira and Azores, but also (though to a lesser extent) of the Algarve region. The importance of this factor in these four regions stems from the relevance of tertiary employment in private services and/or in the public administration sector. The Atlantic regions also perform relatively well on the 'learning families' factor; this may be, to a large extent, a consequence of the peripheral location of these archipelagos.

The region showing the worst performance overall is Alentejo. That performance shows up mainly on the factors associated with knowledge (private technology and public knowledge). Such situation is worsened by the 'R&D intensity' indicator growing below the national average and by a decline in the 'tertiary education' indicator. The Algarve and the two Atlantic regions also show significant weaknesses on the 'private technology' and 'public knowledge' dimensions, but in contrast they have positive performances on the 'urban services' factor. Further the Alentejo is impaired by a low standing on the 'learning families' factor, due to weak performances on life-long learning and the proportion of youngsters in the population.

Interestingly, despite this overall performance, Alentejo is not on the bottom of the national GDP per capita league. The Norte and Centro regions, both much populated than Alentejo, and also the Açores region have (slightly) lower levels of GDP per capita. This is in part because the emigration from Alentejo in previous decades has depressed the 'population' component in the GDP per capita ratio, but it is also a sign of some latent and significant problems in those other Portuguese regions.

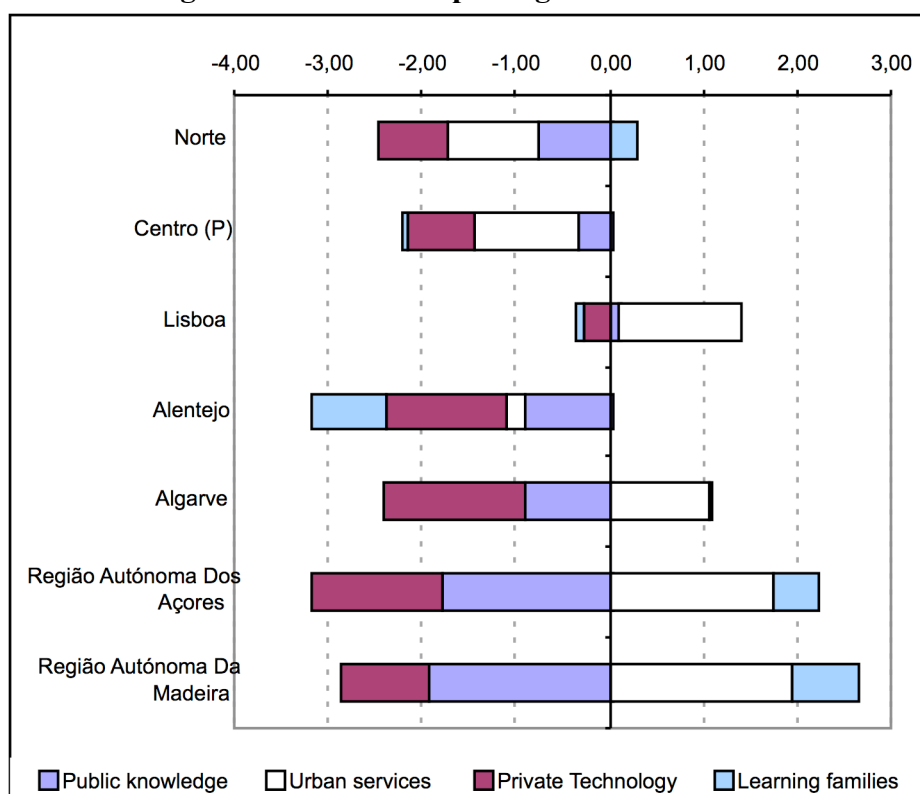
The Açores region shares many characteristics with Madeira (the other Portuguese Atlantic region) but it displays a much lower GDP per capita than the latter. This is so because similar weak structural and cognitive situations have been partially compensated in Madeira through dynamic touristic inflows and the emergence in the most recent decades of other tertiary activities (off-shore banking, namely). The question in relation to this latter region is whether the relative advantage that it was able to develop might be sustainable given the persisting weaknesses in its knowledge indicators. In what concerns yet these two Atlantic regions, which were both typified as part of the EU 'low-tech government' cluster, the most positive aspect for the future is the performance on the 'learning families' factor, stemming mainly from a relatively favourable demographic situation.

In relation to the Algarve region, despite integrating with Alentejo the 'southern cohesion' cluster, its economic situation is much better than the latter, with GDP per capita close to the EU regional average and also an 'urban services' factor scoring well above the EU average. Further, given a relatively good economic outlook in previous years, the Algarve region has been able to attract a significant number of immigrants leading to a rise in its population density between 1996 and 2002. Similarly to Madeira, the touristic sector activities have had a powerful effect in drawing growth and development in the region.

The Centro and Norte regions, which are both part of the so-called ‘eastern cohesion’ cluster, emerge in the Portuguese context with very specific features. Notwithstanding their ‘private technology’ and ‘public knowledge’ situation not being as bad as in the regions mentioned above, their performance in what regards the ‘urban services’ factor is quite poor. This is in part due to a specialisation in low and low-medium tech manufacturing activities. The difficulties in reversing this structural situation translate in very low productivity levels in these regions, which are the lowest among the seven Portuguese regions, and they also account for the recent divergence in GDP growth between the Norte region and the national average.

Lisboa e Vale do Tejo is the only Portuguese region in which the balance between the scores of the four dimensions is positive. Three of those factors (‘public knowledge’, ‘private technology’ and ‘learning families’) are close to the respective EU averages, while the fourth one (‘urban services’) is well above the average. Lisbon is included in the ‘local science and services’ cluster; and is the only Portuguese region with a GDP per capita above the EU25 average. Despite this, the region shows significant weaknesses. Being the most advanced Portuguese region, its performance in the ‘private technology’ factor is poor, while in the ‘public knowledge’ factor it is only marginally better. The pull it has exerted in terms of publicly-financed R&D has not translated into a significant advance with regard to the latter factor. The move towards some knowledge-intensive services sectors over the most recent decades is probably the most favourable change. However, this evolution has mainly happened in the areas within and close to the limit of the city of Lisboa, while the region’s peripheral areas share many of the attributes of the remaining Portuguese regions.

Exhibit 2: Regional factor scores per region



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

All the seven Portuguese regions denote important weaknesses in the two cognitive dimensions drawn from the factorial analysis ('private technology' and 'public knowledge'). As pointed out above, only Lisboa has a positive score on this second dimension, but only marginally above the EU average. This situation is further aggravated by the fact that the knowledge economy activities are relatively absent from the regional economic structures. Most of the regional economic bases are dominated by low-tech, labour-intensive sectors, unable to generate high growth rates. The exception to this is Lisboa, where some activities of higher knowledge-intensity have emerged in a few services sectors, and two of the smaller regions (Algarve and Madeira) where important activities related to the touristic sector have also developed. The problem in relation to these last two regions is that they have not been able to develop accordingly their knowledge infrastructure, raising doubts about the sustainability of their growth trajectories. Further to their cognitive and structural problems, several of the Portuguese regions are also hindered by an unbalanced demographic structure, with an increasingly aged population.

Regional trends in key economic and social indicators are presented on Exhibit 3 below. To some extent, the time frame (1996-2002) overrates performance, since Portugal has entered an economic slowdown period since 2001. An interesting feature is the generalised decline in industry share, with the exception of Algarve. Such decline is especially marked in Norte and Lisboa. With regard to R&D intensity, it is surprising to find a negative evolution in Madeira. The main improvements in this regard were recorded in Algarve and Centro. They are, however, still insufficient to change the concentration of R&D activities in the Lisboa area.

Exhibit 3: recent trends per region in key indicators

		Unemployment	Per capita GDP	Industry share	Agriculture share	Population density	Tertiary education	R&D intensity
		1996-2003	1996-2002	1996-2002	1996-2002	1996-2002	1999-2002	1996-2002
		%-pnt ch.	% growth	%-pnt ch.	%-pnt ch.	%-pnt ch.	%-pnt ch.	%-pnt ch.
EU25		--	--	--	--	--	--	--
Portugal		-1,00	5,63	-2,98	-1,35	3,20	0,68	0,28
Norte	PT11	-0,10	4,60	-3,37	-1,70	2,86	0,45	0,22
Centro (P)	PT16	--	6,71	-1,29	-2,77	1,12	2,49	0,49
Lisboa	PT17	--	5,67	-3,63	-0,11	6,12	5,02	0,28
Alentejo	PT18	--	5,93	-1,22	-3,28	0,82	-3,38	0,10
Algarve	PT15	-2,80	5,76	1,22	-0,26	13,81	0,74	0,82
Região Autónoma dos Açores	PT20	-4,20	7,17	0,48	-1,69	-1,83	-0,19	0,10
Região Autónoma da Madeira	PT30	-1,90	9,10	-0,72	-0,96	-5,27	0,85	-0,19

The analysis carried out above allows one to put forward an agenda of priorities for the seven Portuguese regions. In drawing such agenda one must understand that four of these regions are relatively small in population terms (Algarve, Alentejo, Açores and Madeira have all well less than 1 million inhabitants each), while the other three concentrate most of the Portuguese population (Lisboa, Norte and Centro have above two million inhabitants each). This means that at least for the Algarve and Madeira regions growth will continue to stem from specialised economic bases, in which the activities geared towards tourism will continue to be the regional dynamos. In these two cases it will be important to strengthen the regional knowledge infrastructures. In what regards Açores and Alentejo, innovative strategies will have to be pursued to find new specialisations, together with improvements in the primary activities that still play a significant role in these regions.

For the Norte and Centro regions the priority should be the promotion of structural change. The promotion of new knowledge- and technology-intensive activities will be critical to drive productivity levels upwards. Such structural change will stimulate advances in the 'private technology' factor, but they should be complemented by public initiatives to strengthen 'public knowledge' and life-long learning. These two regions contain some dynamic clusters (mould-making, footwear, clothing, certain types of textiles, plastics, ceramic products, some metal fabricated products) that should be helped to consolidate, by managing more actively their own supply chains, developing marketing competences and moving upward in value-chains.

Finally, in what concerns the Lisboa region, the specialized services suppliers should be helped to enlarge their market by establishing strong customer bases in the remaining regions and in the public administration sector, but also by participating more actively in international markets.

2.3 Conclusions: innovation and knowledge performance

Exhibit 4: summary of key disparities and needs per region

Region / group of regions	Key factors explaining disparity of performance (weaknesses)	Key needs in terms of innovation and the knowledge economy
Centro, Norte	<ul style="list-style-type: none"> Structural composition of the economy dominated by low- and low-medium tech sectors Low levels of educational attainment, not compensated by life-long learning 	<ul style="list-style-type: none"> Promote structural change towards higher productivity activities, namely by supporting new actors and projects Stimulate firms in the specialization sectors to move upwards in their respective value-chains Strengthen the supply of 'public knowledge' Promote life-long learning
Alentejo, Açores	<ul style="list-style-type: none"> Low levels of private and public knowledge Negative demographic trend in recent decades (especially in Alentejo) Relative absence of dynamic local actors (more in Alentejo than in Açores) Peripheral location and archipelagic nature (Açores) 	<ul style="list-style-type: none"> Develop innovative approaches seeking new areas of specialization, following a cluster approach Direct 'public knowledge' activities towards the valorisation of natural resources and primary products Promote life-long learning
Algarve, Madeira	<ul style="list-style-type: none"> These two regional economies have benefited from the development of a strong tourism sector, but in many respects this has evolved as a fragile specialization 	<ul style="list-style-type: none"> Stimulate firms in the tourism sector to move upwards in the value-chain Direct 'public knowledge' activities towards environmental protection and urban revitalization Promote life-long learning Attracting skilled immigrants and providing them with appropriate jobs
Lisboa	<ul style="list-style-type: none"> The centralization of many high level tertiary functions has helped Lisboa to develop in recent decades as the most advanced Portuguese region In contrast to the emergence of a relatively dynamic knowledge intensive services industry, manufacturing higher tech activities have remained underdeveloped, with 'private technology' scoring badly 	<ul style="list-style-type: none"> Knowledge-intensive services firms should be stimulated to build up larger customer bases in the remaining Portuguese regions Simultaneously they should be helped to participate more actively in the international trade of advanced services New actors and new projects in these industries and also in high-tech sectors should be supported Life-long learning should be promoted

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

Structural Fund support for innovation and knowledge is contingent on and seeks to strengthen the existing national (and/or regional) innovation system⁶ in each Member State. In particular, institutional, legal and financial factors in the innovation system can limit the potential for certain types of intervention. Moreover, within the framework of the EU's "Lisbon objectives", Structural Fund interventions are expected to complement and provide added value to national (or regional) policy framework. In some Member States, Structural Fund interventions in favour of innovation and knowledge are marginal with respect to the national investment and policy effort, in others Structural Funds provide a main source of funding for such interventions. In both cases, there is a need to identify relevant national and EU policies which can have an impact on decisions on funding priorities.

3.1 Institutional and legal framework for innovation and the knowledge economy

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

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

Traditionally, the institutional and legal framework for innovation in Portugal has been characterised by two key features: (1) a centralisation of institutions and policies, since Portugal is not a regionalized country; and (2) a divide between research and enterprise policies, carried out by different Ministries, each one with specific operational programmes (OPs) supported by Structural Funds. In what follows immediately we will focus on these two key features.

Portugal is not a regionalised country, except for the autonomous Açores and Madeira regions. Policy, including innovation policy, is mostly designed and managed at national level. There are, however, policy coordinating bodies at regional level – the Commissions for Regional Coordination and Development (CCDR). Their responsibilities and capabilities are relatively limited. The CCDR managed the

⁶ The network of organisations, individuals and institutions, located within or active within national or regional boundaries, that determine and shape the generation, diffusion and use of technology and other knowledge, which, in turn, explain the pattern, pace and rate of innovation and the economic success of innovation.

regional programmes of innovative actions (PRAI), some of them leading to the launching of regional initiatives towards innovation.

In the context of CSF III, some deconcentration was introduced. This included namely: (1) the definition of seven Regional OPs (one for each of the five Continental regions plus the Madeira and the Açores autonomous regions), including actions aimed at promoting regional initiatives to reduce regional imbalances (the amount allocated to these 7 OPs corresponded to 40 per cent of the CSF III funds); and (2) the provision, within each ‘sectoral’ OP⁷, of a budgetary line for ‘non-concentrated’ actions.

Traditionally, research and enterprise policies are assigned to different Ministries:

- **The Ministry for the Economy and Innovation (MECI)**, which addresses the relationships with firms and the support to firm’s growth and investment, including innovation. Its main programme, supported in CSF III is the OP for Modernising the Economy (PRIME), formerly labelled POE (the Operational Programme on the Economy). The main organisations under the MECI include the agency in charge of supporting SMEs investment (IAPMEI), the agency for supporting large investments both domestic and foreign (API), the foreign trade institute (ICEP), the institute for quality and standards (IPQ), the institute for industrial property (INPI) and the public laboratory for industrial engineering and technology (INETI); a reduction in the number of institutions is expected in the future;
- **The Ministry for Science and Higher Education (MCES)**, focussed on higher education and research policy, has also responsibilities on knowledge society issues. There are two main OPs under its purview: the OP Science and Innovation (POCI_2010), dealing mainly with higher education and research policy; and the OP on the Knowledge Society (POS_C). The budget of these two programmes is, however, limited when compared to PRIME: the funds assigned to PRIME are more than five-fold the sum of those for POCI 2010 and POS_C for the 2000-2006 period. The main agencies under MCES are: the Science and Technology Foundation (FCT), the main basic research funding organisation; the Agency for Innovation and Knowledge (UMIC), mainly concerned with knowledge society issues; and the innovation agency (AdI). This is a joint-venture between MCES and MECI, which has been assigned the management of most measures dealing with University/Industry R&D consortia, tax support to R&D activities by companies, creation of new technology-based firms, and technology transfer.

The main issues arising with regard to the impact of these organisations on the working of the NSI are the following: insufficient inter-organisation coordination and cooperation; inconsistency in the definition of some organisations missions; and weak strategic capabilities of several organisations.

A summary of the main organisations dealing with innovation and knowledge economy issues in Portugal in the various policy areas is presented on Exhibit 5.

⁷ The most relevant for innovation and the knowledge economy were the Operational Programmes on the Economy (POE, now PRIME), on Science, Technology and Innovation (POCTI, now POCI_2010) and on the Information Society (POSI, now POS_C). More on this below.

Exhibit 5: main organisations per policy area.

	Type of organisation	
Policy objectives	National (&/or regional) public authorities and agencies	Key private or non-profit organisations
Improving governance of innovation and knowledge policies	<ul style="list-style-type: none"> • Lisbon Strategy and Technology Plan Coordination Unit • Regional Coordination Commission (with limited mandates) 	<ul style="list-style-type: none"> • COTEC
Innovation friendly environment	<ul style="list-style-type: none"> • Innovation Agency (AdI) • IAPMEI • Innovation and Knowledge Agency (UMIC) • Public Universities 	<ul style="list-style-type: none"> • Private Universities
Knowledge transfer and technology diffusion to enterprises	<ul style="list-style-type: none"> • Innovation Agency (AdI) • National Institute for Industrial Engineering and Technology – Public Laboratory (INETI), together with other public R&D labs 	<ul style="list-style-type: none"> • COTEC • Incubators • Technological Centres • GAPI Network
Innovation poles and clusters	<ul style="list-style-type: none"> • Innovation and Knowledge Agency (UMIC) • Regional Coordination Commission 	<ul style="list-style-type: none"> • Taguspark
Support to creation and growth of innovative enterprises	<ul style="list-style-type: none"> • Innovation Agency (AdI) • Innovation and Knowledge Agency (UMIC) 	
Boosting applied research and product development	<ul style="list-style-type: none"> • Innovation Agency (AdI) 	

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

Most policy initiatives taken in the last 20 years, either in the science or in the enterprise policy areas, have been partially financed by the Structural Funds. The impact of such initiatives has been limited by the lack of a consistent innovation policy, due to the ‘divide’ between science policy, on the one hand, and enterprise policy, on the other.

In November 2005, the Socialist government disclosed a Technological Plan. Originally placed under the coordination of the MECl, the management of the Plan was transferred to the Prime Minister’s level and associated with that of the Lisbon strategy. The implementation of the Plan will be subject to a follow up process, involving the creation of two bodies: an Interministerial Follow-up Commission, including representatives of the main ministries concerned by the Plan; and an Advisory Board, a group of 41 experts – including businessmen, academics and policy makers - charged of assessing the contents as well as the progress in implementing of the Plan.

3.2 Policy mix assessment

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

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

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

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

Exhibit 6: Policy mix for innovation and knowledge

Policy objectives	Target of policy action		
	Academic /non-profit knowledge institutions	Intermediaries/bridging organisations	Private enterprises
Improving governance of innovation and knowledge policies		Technological Plan	
Innovation friendly environment			Enterprise Now, Trademark Now, INOV, JOVEM
Knowledge transfer and technology diffusion to enterprises		TTQ Infrastructures Technology Centres S&T parks, OTICs OTIC – Technology and Knowledge Transfer Offices	
Innovation poles and clusters		Competitiveness Poles (to be launched) OTIC – Technology and Knowledge Transfer Offices	
Support to creation and growth of innovative enterprises			NEST FINICIA
Boosting applied research and product development	Doctoral Grants in Companies	IDEIA – R&D Consortia	SIME I&DT NTEC
Legend			
Top policy priority			
Secondary priority			
Low priority			

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

Improving governance capacities for innovation and knowledge policies has been mostly pursued at central level. Nevertheless, initiatives taken by CCDRs in the context of the regional programmes of innovative actions deserve also a reference. The secondary priority assigned to this policy objective is mainly due to the results achieved so far in general terms. In fact, although some attempts have been taken to overcome the traditional 'divide' between science and enterprise policies (namely the launching of PROINOV), the results so far were relatively poor.

The Technological Plan may contribute to overcome that divide, by strengthening the coordination at the Prime Minister's level. The fact that the coordination of the Technological Plan and the National Lisbon Reform Plan were placed together is an encouraging sign. The Technological Plan addresses three main issues: (1) Knowledge, with a view to improve the skills of the population for the knowledge society, by increasing educational levels and by promoting lifelong learning; (2) Technology, aiming at overcoming scientific and technological backwardness by accelerating scientific and technological development, improving national competencies in S&T, encouraging scientific employment and promoting business enterprises' R&D activities; and finally (3) Innovation, by mobilising companies together with other actors of the national innovation system around a national innovation strategy, involving the development of differentiation factors, the strengthening of company R&D capabilities as well as of technology transfer processes, and the inflow of foreign investment.

Still in the governance objective, a reference is due to the improvements introduced in the governance of academic research policy. Since 1995, a new research funding policy was progressively implemented with very positive results. Funding criteria were made more clear, while international evaluation of project applications and research performance helped to increase research quality. In parallel, opportunities for international collaboration, namely in the context of the 5th and 6th EU Framework Programmes, were exploited with relative success. The Technological Plan indicates a commitment towards a continuous improvement in this area. The main problem rests, however, in the development of linkages with the economic fabric.

The creation of an innovation-friendly environment has been one important objective of public policy. It has mostly addressed companies. It focussed on the provision of innovation financing to companies, particularly in the context of Structural Funds support, and not so much on the provision of technology services. Actions aimed at regulatory improvements and innovative approaches to public services and procurement have been very limited. A recent report on the strategy for the next round of Structural Funds support stresses the need to use the envisaged investment in infra-structures to start a coherent public procurement policy aimed at promoting innovation⁸. A few regulatory improvements, aimed at curbing bureaucracy and at extending e-government, have also contributed towards a more innovation friendly environment. This is the case of the initiatives 'Enterprise Now' and 'Trademark Now' launched in the context of the Technological Plan. This is expected to have a relevant impact on curbing bureaucracy and encouraging innovation. The third group of actions in this policy area deals with the development of human capital for the

⁸ See M.M. Godinho and V.C. Simões, *I&D, Inovação e Empreendedorismo*, Observatório do QCA, Lisbon, 2005.

knowledge economy. The results achieved so far have been limited. The envisaged development of Technology Specialisation courses is expected to have a positive contribution in this regard. Another initiative deserving to be mentioned was the launching in 2004 of a measure providing grants for doctoral projects being carried out within companies.

Knowledge transfer and technology diffusion to enterprises has not been a top policy priority in Portugal, in spite of its revival (in a very ‘linear-model’ approach) in the sequence of the mid-term review of POCTI (which became afterwards POCI_2010). Portugal’s policy mix has favoured indirect or supply-led instead of direct or demand-led support measures. There are very few support schemes specifically aimed at encouraging firms demand for technology-related services, with the exception of the initiative aimed at promoting the involvement by SMEs in the digital economy and the increase in the percentage of investment incentives, when companies contract services from S&T organisations. However, direct technology support services to SMEs are not available across the country; some Regional Coordination Commissions (CCDRs) have already shown some interest in launching such services. The Technological Plan mentions the intention to create a nation-wide Network of Technology Services. A reference should also be made to the launching of the OTIC programme, on the establishment of technology and knowledge transfer offices.

Indirect support, provided through S&T intermediary organisations – called in the Portuguese jargon “S&T infrastructures” –, dominates the scene. In the late 1980s, in the context of the first PEDIP (the Specific Programme for the Development of the Portuguese Industry), a large number of new organisations were created: technology transfer centres, new technology institutes, science and technology parks, and technological centres. All the following CSF rounds, included measures aimed at supporting the development and consolidation of those ‘bridging’ organisations. Technological centres, organised more in terms of industries than of particular technologies, are the most relevant among the organisations providing technology support services to firms. Assessment of technological centres performance shows, however, a wide variance in performances. With regard to S&T parks, the most successful has been Taguspark, located in the Lisbon area.

The development of innovation poles or clusters has not been a key policy objective in practical terms. In fact, PROINOV, launched in 2000 but short-lived, put a strong emphasis on a cluster approach. Some tentative clusters were defined and preparatory work was undertaken. This initiative, however, was never materialised into concrete actions. Initiatives aimed at inter-firm cooperation on a regional basis were relatively weak, and never figured high in the policy agenda. The OTIC initiative (Technology Transfer and Innovation Offices) launched by UMIC allegedly espouses a cluster approach; it is, however, too recent so that one can have a clear picture of its effectiveness. The Technological Plan includes several transversal networking initiatives to enhance partnerships as well as the creation of virtual technological poles; such intentions did not materialise so far into concrete actions. An important structure for the incubation of technology-based start-ups is Taguspark, already mentioned. An association of S&T parks in Portugal was established some years ago.

Support to the creation and growth of innovative enterprises has been provided mainly through the provision of direct incentives. The main measure is the NEST

programme, aimed at fostering the creation of technology-based firms. It provided venture capital support, taking a share in firms' equity. Evidence so far indicates, however, that the programme was not successful in stimulating start-up initiatives. A new programme (FINICIA) has just been launched in this field.

The boosting of applied research and development has long since been one of the key elements of the policy mix for innovation and knowledge. Traditionally, this has been approached through the support to University/Industry R&D consortia, with two different types of programmes: those led by the ministry in charge of science policy, where the focus was put on the academic involvement with firms; and those led by the ministry in charge of economic affairs, approaching the issue from the company end. This led to competing and overlapping programmes, as well as to an undesirable dispersion of resources. In 2002, a decision was taken to somehow combine both approaches, launching a new programme (IDEIA), which substitutes for the previous, separate programmes. This was a positive development, making more clear and easy the cooperation between companies and Universities/S&T infra-structures in applied research. Another example concerns demonstration programmes, aimed at promoting the cooperative development and diffusion of new technologies. A final reference is due to the tax incentives for R&D, aimed at encouraging the carrying out of R&D activities by companies, as well as to the support to the creation of small R&D teams in firms.

A general perspective of the policy mix shows that it included a wide range of measures addressing all the main policy areas. The two aspects with lower priority were the provision of technology support services to SMEs (which should have been carried out mostly on a regional, proximity basis) and the development of clustering (where the only relevant initiative was short-lived). Another major weakness concerned the definition of the policy mix itself, since the coordination between science and enterprise policies to generate a consistent innovation policy has been weak. The launching of the Technological Plan, which encompasses the various policy axes, may be an opportunity for designing and implementing a coherent innovation policy. The assignment of coordination responsibilities to a body placed under the direct supervision of the Prime Minister seems to be a good solution. Time will show whether it will work in practice, bridging different perspectives and giving rise to a consistent, integrated innovation and knowledge policy.

3.3 Conclusions: the national innovation system and policy mix

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

Policy objectives	Opportunities for Community funding (national priorities)	Constraints or bottlenecks (factors limiting Community funding)
Improving governance of innovation and knowledge policies	<ul style="list-style-type: none"> • Increased linkages between ‘sectoral’ and ‘regional’ innovation approaches • More appropriate definition of OPs in the context of the next National Strategic Reference Framework (2007-2013) 	<ul style="list-style-type: none"> • Coordination is mainly a domestic problem, which calls for a stronger involvement at higher government level, and is not so much dependent on funding • The policy approaches need to be both top-down and bottom-up, stimulating the participation of the economic actors
Innovation friendly environment	<ul style="list-style-type: none"> • Stronger focus on this issue, as a consequence of the Technological Plan • Reorientation of innovation financing mechanisms • Need for increased linkages between innovation policy and public procurement in the context of the next round of EU support 	<ul style="list-style-type: none"> • Withdrawal of the Lisboa e Vale do Tejo region from Objective 1 • Structural limitation of Portugal’s financial markets, namely venture capital markets • Trade-offs between innovation-oriented public procurement policy and competition policy
Knowledge transfer and technology diffusion to enterprises	<ul style="list-style-type: none"> • Need for a stronger focus on direct support to firms • Need for further strengthening of S&T infrastructures • Increased opportunities for further actions at regional level as well as for public-private partnerships 	<ul style="list-style-type: none"> • Direct support to firms is less amenable to grants, but rather to the structuring of appropriate organisations and financing of their current activities • Risk of an excessive regionalisation of support mechanisms; adequate national/regional balance needs to be achieved
Innovation poles and clusters	<ul style="list-style-type: none"> • Clustering approaches most be more relevant in policy terms • Opportunities for regional innovation initiatives in the wake of PRAIs • Relevance of the transversal networking approach in the context of the Technological Plan • Intention to encourage the dynamisation of regional competitiveness poles 	<ul style="list-style-type: none"> • Lack of scale and synergy exploitation in regional initiatives, if not properly matched with national policies • Risk of ‘appropriation’ by specific local interests

Support to creation and growth of innovative enterprises	<ul style="list-style-type: none"> Increasing consensus about the need for a stronger bet on the creation of NTBFs; ambitious goals should be set on this regard Linkages between NTBFs creation and FDI attraction, with new structuring projects 	<ul style="list-style-type: none"> Insufficient human resources base in science and engineering fields Low risk taking attitudes Low human resources mobility and low university/industry linkages Venture capital market weaknesses
Boosting applied research and product development	<ul style="list-style-type: none"> Increasing consensus about the need for encouraging applied research Development of sectoral innovation initiatives Further development of programmes implemented in CSF III Increasing international competition requires firms to increase their commitment to applied research and product development. 	<ul style="list-style-type: none"> Difficulty to promote the dialogue between University and industry Low innovation commitment by firms Exclusion of Lisboa e Vale do Tejo region from Objective 1
Investment in basic research capacities	<ul style="list-style-type: none"> Further development of a successful policy towards basic research Increasing need to respond to FP 7 challenges 	<ul style="list-style-type: none"> Regional concentration of basic research, compounded with the exclusion of Lisboa e Vale do Tejo region from objective 1 Advantages of stabilising basic research policy and support may lead to put this policy increasingly under the purview of national budget Matching problems between Structural Funds and FP7 policies objectives

A main conclusion of the final report that summarises the updating of all the sectoral and regional OPs⁹ is that a reform of the governance of ‘innovation’ and ‘knowledge’ should be implemented in the new National Strategic Reference Framework. This means that a systemic view needs to be developed on the policy supply side, with greater coordination of different Ministries and public organisations involved in this policy area. Simultaneously, it will be necessary to further involve the economic actors, in the setting of the agendas and in stimulating the necessary clustering effects.

⁹ See Quaternaire Portugal, CEDRU and TIS.pt, *Estudo da actualização da Avaliação Intercalar do Quadro Comunitário de Apoio 2000-2006*, Lisboa, December 2005.

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

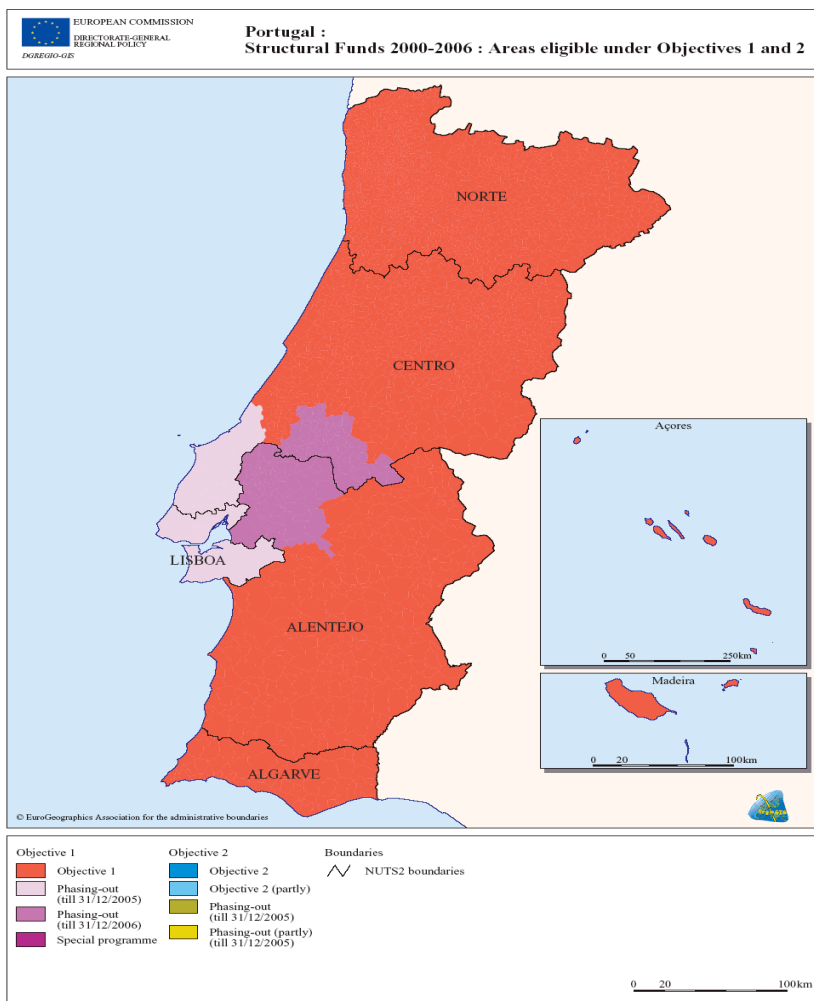
This section of the report provides an analysis of the patterns of Structural Fund expenditures in the fields of innovation and knowledge-based economy during the current programming period (2000-2006 for EU-15 or 2004-2006 for the new Member States). It examines the patterns from both a strategic point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

4.1 Strategic framework for Structural Fund support to innovation and knowledge

4.1.1 Strategic approach to innovation & knowledge in Structural Fund programmes

Portugal is now reaching the end of the programming period of CSF III (2000-2006). The Operational Programmes (OPs) under CSF III are very wide ranging. Overall 20 of such OPs exist, being one of them for 'technical assistance', seven having a regional focus, and the remaining having a sectoral orientation covering different 'structural' policy areas (from the 'environment' to 'culture'). Overall the expected investment of these OPs will reach 35.6 bln EUR, which on an annual basis represents about 4% of the Portuguese GDP. More than half of this investment is directly supported by EU Structural and Cohesion Funds (54%). The OPs were initially designed to address all the Portuguese territory under Objective 1 priority, but as highlighted in the map below the Lisboa e Vale do Tejo region has meanwhile lost access to CSF funds from 31.12.2005.

CSF III defined four major strategic objectives for the period 2000-2006, translated into four practical 'priorities', to which the regional and sectoral OPs were assigned. Those priorities aimed at: (i) improving skills amongst the Portuguese, promoting employment and social cohesion; (ii) modifying the profile of production towards the activities of the future; (iii) asserting the value of the land and the geo-economic standing of the country; and (iv) promoting sustainable regional development and national cohesion. It becomes clear that the first two priorities are the ones that have more to do with 'innovation' and 'knowledge'. The rationale that underpinned the CSF III overall design was that Portugal had to raise her productivity levels in order to maximize the chances of catching up with the most advanced economies. This central objective was to be reached while minimizing the negative impact on other areas, namely social cohesion and sustainability.



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

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

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

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

Objective	Total cost		SF		NF	
	Total		ERDF	ESF	Public	Private
Objective 1	1 594 194 298,16	862 629 148,35	607 352 200,35	255 276 948,00	672 031 398,63	59 533 751,18
Objective 1	35 582 765 279,00	19 177 455 111,00	13 372 733 020,00	4 525 014 091,00	11 403 737 331,00	5 001 572 837,00
TOTAL COHESION POLICY						

Source: programming documents and financial data provided by DG REGIO

Exhibit 9: Regional allocation of resources (Euro)

Programs	RTDI INTERVENTIONS		ESF		TOTAL	
	Total SF	ERDF	Total SF	ERDF	ERDF	ESF
OBJECTIVE 1						
Lisboa e Vale do Tejo	18 735 544,60	18 735 544,60	1 516 328 299,00	977 483 220,00	437 493 079,00	
PO Alentejo	5 237 124,20	5 237 124,20	1 281 874 121,00	888 576 121,00	118 608 000,00	
PO Algarve	3 967 032,42	3 967 032,42	479 006 359,00	387 623 359,00	52 181 000,00	
PO Centro	23 397 995,07	23 397 995,07	1 795 385 072,00	1 369 991 072,00	218 176 000,00	
PO Madeira	7 834 302,35	7 834 302,35	739 847 621,00	521 711 621,00	110 321 000,00	
PO Norte	37 715 561,52	37 715 561,52	2 865 072 447,00	2 183 155 447,00	461 583 000,00	
Região Autónoma dos Açores	9 568 400,00	9 568 400,00	905 243 101,00	623 593 101,00	116 173 000,00	
Total Regional OPs	106 455 960,16	106 455 960,16	9 582 757 020,00	6 952 133 941,00	1 514 535 079,00	
OBJECTIVE 1						
Accessibilidades e Transportes	0,00	0,00	1 457 234 345,00	1 457 234 345,00	0,00	
Ambiente	0,00	0,00	332 656 000,00	332 656 000,00	0,00	
Ciência, Tecnologia, Inovação	648 218 968,00	392 942 020,00	712 911 598,00	428 587 721,00	284 323 877,00	
Cultura	0,00	0,00	249 108 590,00	249 108 590,00	0,00	
Economia	45 130 071,19	45 130 071,19	2 833 452 753,00	2 592 835 753,00	240 617 000,00	
Educação - PRODEP III	0,00	0,00	1 167 417 000,00	403 346 000,00	764 071 000,00	
Emprego, Formação e Desenvolvimento Social	0,00	0,00	1 664 098 686,00	65 404 000,00	1 598 694 686,00	

PO obj. 1 Assistência Técnica	0,00	0,00	0,00	76 824 071,00	33 008 042,00	43 515 029,00
PO obj. 1 Pêche (continent)	11 682 400,00	11 682 400,00	0,00	177 922 000,00	14 603 000,00	0,00
Saúde	0,00	0,00	0,00	496 834 048,00	477 574 628,00	19 259 420,00
Sociedade de Informação	51 141 749,00	51 141 749,00	0,00	426 239 000,00	366 241 000,00	59 998 000,00
Total Multiregional OPS	756 173 188,19	500 896 240,19	255 276 948,00	9 594 698 091,00	6 420 599 079,00	3 010 479 012,00

Source: programming documents and financial data provided by DG REGIO

Based on a strict innovation and knowledge definition, one concludes (exhibit 8) that the expenditure in this area represents a small fraction of the total budget of CSF III (4.5%). This stricter definition underrates however other contributors to these policy areas, in particular those of POE but also to a certain extent those of POSI/POSC. Broader definitions of innovation and knowledge (calculations 2 and 3) bring that proportion to higher values, respectively 14.1% and 15.4%. These figures need however to be qualified in the sense that a significant part of this planned expenditure is geared towards new technology diffusion and dissemination of information among business firms rather than to support proper innovation.

In accordance to the stricter definition the amount to be invested in innovation and knowledge originating from the Structural Funds is 862.6 MEUR over the period 2000-2006. This represents a relative participation of Structural Funds in this type of actions of the same magnitude as for CSF III overall (54%). Further much of this structural aid is conveyed by just one programme (Ciência, Tecnologia e Inovação, POCTI/POCI 2010), which concentrates 75% of the funds allocated to innovation and knowledge. This means that the remaining funds are scattered among a number of other OPs, namely the 7 regional OPs and three other sectoral interventions (POE/PRIME, POSI/POSC and PO Pescas).¹⁰ In several cases the allocated funds are just of a few MEUR, raising the question of whether these smaller actions might have an adequate scale to deal with existing problems and to originate any significant leveraging effects. Even in the cases of the few OPs where the level of allocated resources is higher (between 20 MEUR and 50 MEUR, mentioned in exhibit 9 above), the integration or establishment of collaborative arrangements with the larger national schemes might be an alternative to be analysed in the context of the preparation of the next programming period interventions.

In what respects the main OP in this area (POCTI/POCI 2010), it is clear that it has had a critical role in supporting and financing R&D activities in Portugal. However, as it is noted in the report submitted in October 2005 to update the intermediate evaluation of POCTI¹¹, the reprogramming of this OP did not address most of the recommendations that had been put forward in the intermediate evaluation, which was finalised in November 2003. In that report it is pointed out that the intermediate reprogramming addressed only partially the need to improve the overall governance structure of the diversity of actions promoted by different OPs aiming at innovation. The same inference is put forward in the final report that summarizes the studies that updated all the sectoral and regional intermediate evaluations.

The brief but important conclusion to be drawn is that while the Structural Funds support to RTDI has had a beneficial effect in terms of supporting public funds geared towards R&D activities in Portugal, the fact that a global vision with respect to innovation and knowledge has been lacking – both in the initial design of CSF III and in its reprogramming – hindered the possibility of an adequate structural adjustment. The 2000-2006 period has witnessed an increasing divergence in relation to the average values of the most important economic indicators of the EU. This is in part

¹⁰ In the data that was provided to comment, information about the Agriculture OP is missing. Even though this OP also encompasses RTDI actions, accounting for it would not significantly change the analysis.

¹¹ SPI, Relatório Final do “Estudo de Actualização da Avaliação Intercalar do Programa Operacional Ciência, Tecnologia e Inovação”, Porto: October 2005.

explained by exogenous factors, including the EU enlargement and the role played by the emerging economies in international trade. But the fact that CSF III has allowed the RTDI and innovation policies of each ministry or region to express mostly as independent sectoral and regional interventions, without a proper systemic view integrating them, contributed to the incapacity in producing the necessary structural adjustments.

Structural Funds support has played a central role in promoting national RTDI effort, in terms of both innovation and R&D investments. All the key measures aimed at strengthening companies' competitiveness and innovation capabilities are partially financed by Structural Funds. With regard to R&D, according to possible estimates, Structural Funds alone have accounted somewhere between one-fourth and one-third of government outlays for R&D on an annual basis since 2000.

The impact of other EU supported initiatives has been more limited. RIS, RITTS and Innovative Actions have, however, contributed for some regions to assess their potential, to increase regional players' awareness and mobilisation towards innovation, and to launch some interesting regional initiatives (for instance, entrepreneurship contests and setting up innovation support services to SMEs).

4.1.2 Specific measures in favour of innovation and knowledge

Taking into account (i) the main policy measures addressed to promoting innovation and knowledge in Portugal, especially those launched in the context of CSF III (2000-2006), (ii) the programming complement documents relating the POE/PRIME, POCTI/POCI 2010 and POSI/POS_C and (iii) the information provided by the Trend Chart on Innovation¹², Exhibit 10 provides a synthesis of key measures

Exhibit 10: Key innovation & knowledge measures

Policy area	Number of identified measures (all programmes)	Approximate share of total funding for innovation & knowledge measures	Types of measures funded (possibly indicating importance)
Improving governance of innovation and knowledge policies	1*	n/a	Funding is not provided directly by the Technological Plan, but mainly through OPs partially supported by Structural Funds
Innovation friendly environment	16	n/a	This policy area encompasses a wide range of different types of measures. Broadly speaking, these may be clustered around six axes: (1) general support to investments in companies modernisation, including innovation initiatives, and the launching of new investment projects, <i>inter alia</i> foreign investments; (2) financial engineering, including the creation of a venture capital syndication fund; (3) direct support to the creation and development of S&T infra-structures; (4) integration of skilled human resources in companies; (5) stimulus to the use of intellectual property systems; and (6) promotion of the involvement of firms, namely SMEs, in the digital economy.

¹² See <http://trendchart.cordis.lu/>

Policy area	Number of identified measures (all programmes)	Approximate share of total funding for innovation & knowledge measures	Types of measures funded (possibly indicating importance)
Knowledge transfer and technology diffusion to enterprises	10	n/a	In general terms one may identify three main types of measures: (1) mobilising and demonstration projects aimed at developing new technologies and disseminating them throughout the economic fabric; (2) indirect support, by promoting the development of S&T infra-structures providing services to firms; and (3) measures aimed at technology transfer in the ICT area. It should be remarked that most of the measures included in this area also span to other policy areas, namely the creation of an innovation friendly environment and boosting applied research and product development.
Innovation poles and clusters	3	n/a	The 3 measures in this area concern the creation of technology transfer offices in Universities and Polytechnic Institutes, the development of competence centres and clustering in the ICT field, and the promotion of inter-firm cooperation
Support to creation and growth of innovative enterprises	5	n/a	Measures in this field include the following: creation of new technology based firms (including a programme specifically focussed on ICT), support to incubators, and development of venture capital activities.
Boosting applied research and product development	9	n/a	This area encompasses 4 main types of measures: (1) promoting of applied research consortia including S&T organisations and companies; (2) wider technology mobilising and demonstration programmes; (3) support to R&D activities in companies; and (4) support to the involvement of Portuguese organisations in the Research FP.

* The carrying out of PRAIs by CCDRs was not considered. Should it be included, the number will be 8.

Nb: this table is a summary of the table in appendix D.2.

The key measure aimed at improving **the governance of innovation and knowledge policies** is the Technological Plan that was launched in 2005. This intervention is expected to provide a more coherent framework for coordinating innovation and knowledge policies in Portugal, bridging the traditional divide between science and enterprises policies. The assignment of policy coordination responsibilities to the Prime Minister level is a positive sign in this regard. It should be remarked that the Technological Plan is mainly a policy document, and is not granted a specific budget. Despite the Plan not being part of the formal structure of CSF III, most of its measures will take place in the context of OPs, and as such it will be financed by Structural Funds.

At regional level, a reference should be made to the launching of regional programmes of innovation actions, with EU support, coordinated by the CCDRs (Commissions for Regional Coordination and Development). These programmes were launched for all the Portuguese regions but Açores and Madeira: NORTINOV, in the Norte region; PRAI Centro, in the Centro region; LISACTION, in the Lisboa e Vale do Tejo region; PRAI Alentejo, in the Alentejo region; and INOVALGARVE, in the Algarve region. These programmes, although with different levels of development and performance, have played a positive role in increasing awareness about innovation challenges.

Turning now towards the other five policies areas, two opening remarks are in order. First, all the measures considered in Exhibit 10 are included in OPs associated with Structural Funds interventions. Second, policy measures outside the scope of the three main OPs in the innovation and knowledge area, (POE/PRIME in enterprise policy; POCTI/POSI 2010 in science policy; and POSI/POS_C in information society policy)

were not considered¹³. The most remarkable example of a measure outside the scope of an OP is SIFIDE, the system of fiscal incentives for investment in R&D.

The measures aimed at **creating an innovation-friendly environment** are both the most numerous and those which concentrate most funding. These measures are offered mainly in the context of PRIME, the most relevant in financial terms being so far SIME, the system of incentives for company modernisation. It is a general investment system, providing support to investment projects, many of them with a marginal effect on innovation. To overcome this problem, only those SIME investments classified as having an innovative content were included in the estimates provided in Exhibit 10. The same happens with SIPIE, a similar system addressed to small investment projects.

Besides SIME and SIPIE, measures included in this policy area may be classified in five main groups: (1) financial engineering measures (under PRIME), aimed at improving SMEs access to financing and, more specifically, at encouraging venture capital markets; (2) measures aimed at supporting the development of S&T infrastructures; (3) the integration of skilled human resources in companies; (4) the encouragement of industrial property utilisation, namely patents; and (5) the promotion of firms' involvement in the digital economy.

The measures focussed on **knowledge transfer and technology diffusion to enterprises** have addressed more the supply than the demand side. In other words, they were mostly indirect, providing support to S&T organisations. Even the so-called demonstration projects (DEMTEC), aimed at the development of new technologies and its dissemination to firms, seem to be 'technology push' approach influenced by a recent evaluation of PRIME indicates¹⁴. The technology-push, supply-side bias is particularly clear in the new measures set up in the revision that transformed POCTI into POCI 2010 late in 2004. There is a need to look at the other side – to stimulate company demand.

The **'innovation poles and clusters'** policy is the one where less measures have been taken. This is not surprising, since it has not been among the key policy objectives. The recent revision of PRIME encourages investments which may contribute for the development of clusters in tourism, health, fashion, habitat and renewable energy. All the three measures recorded in Exhibit 10 are relatively recent, being therefore too early to evaluate them. Most observers of Portugal's innovation policy converge, however, in considering that there is a need for a more committed action in this area.

With regard to the **'support to creation and growth of innovative enterprises'**, existing measures may be clustered in two main groups; (1) those which provide direct support to the creation of new technology based firms (NTBFs), such as NEST¹⁵, the vector of SIPIE focussed on skilled entrepreneurship and NEOTEC, supporting the creation of NTBFs in the ICT field; and (2) indirect measures, aimed at supporting incubators and enhancing venture capital activities. Though launched less

¹³ This does not imply that other OPs were not relevant, as indicated in Exhibit 9. This is namely the case of OP Pescas and the regional Ops.

¹⁴ See, *Actualização da Avaliação Intercalar do Programa de Incentivos à Modernização da Economia: Relatório Final*, November, 2005.

¹⁵ NEST stand for "novas empresas de support tecnológico" (new technolog-based firms).

than three years ago, it may be said that NEST was a failure: it was not able to attract a minimum level of applications, largely due to the complexity it involved. The other two systems (SIPIE for small technology based firms and NEOTEC) are still too young to be evaluated. The government has recently disclosed a new organization of public venture capital companies and funds. The overall mid-term evaluation of CSF is very critical with regard to NTBFs policy¹⁶. Also a recent analysis on the next round of Structural Funds support¹⁷ advocated the need for significantly increase the number of new NTBFs in the country, which required a revision of existing systems, and the design of a new incentive system for high-tech start-ups.

Boosting applied research and development is a policy area which has traditionally been pursued by OPs concerning both the science and the enterprise areas. The above mentioned merging of two former initiatives in POCTI and POE in just one system – IDEIA – aimed at supporting R&D consortia between firms and S&T organizations has been seen as a very positive step. This shows that in some cases policy effectiveness may be better achieved through a rationalization of programmes, generating scale economies, than by a multiplication, and therefore dispersion, of measures. Another relevant initiative in this field was the launching of the NITEC programme, aimed at supporting the creation of R&D teams in firms. It generated a relatively large number of applications, and seems to respond the need for strengthening Portuguese firms’ technological and innovation capabilities.

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

4.2.1 Management and coordination of innovation & knowledge measures

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

The coordination of innovation and knowledge policies in the context of Structural Funds support is a need acutely felt. It is not so much due to a specific limitation in the design of the CSF, but rather to the ‘original divide’ in Portuguese economic policy between science and enterprise policies. Such a divide makes difficult the definition of a consistent innovation policy – a problem already mentioned in the

¹⁶ See Quaternaire Portugal, CEDRU and TIS.pt, *Estudo da actualização da Avaliação Intercalar do Quadro Comunitário de Apoio 2000-2006*, Lisboa, December 2005

¹⁷ M.M. Godinho and V.C. Simões, *I&D, Inovação e Empreendedorismo*, Observatório do QCA, Lisboa, 2005.

present report and often mentioned in policy analysis in this field¹⁸. It has also led to a Ministerial ‘appropriation’ of ‘specific’ sectoral programmes financed by the Structural Funds since CSF I. The ‘divide’ between PEDIP and CIÊNCIA was to some extent a continuation of the ‘original sin’ in the CSF era and it has been repeated again and again, in the second and in the third CSFs.

This perspective is endorsed in the recent actualisation report of the CSF III (2000-2006) mid-term evaluation¹⁹. This argues that there are problems inherent to OP design which limit the effectiveness of OP interventions towards innovation and productivity. More specifically, it is mentioned the need for policy coordination aimed at “readjusting the strategy of strengthening the national system of innovation, introducing an increased inter-action with technological development to respond to R&D needs felt by the business firms sector”²⁰.

The problems stemming from the dispersion of OPs, with three CSF III OPs relevant for innovation and knowledge policies (POE/PRIME, POCTI/POCI 2010 and POSI/POS_C), were further compounded by the lack of coordinating structures at higher governmental level. In addition to that, there were no ‘bottom-up’ initiatives which might have contributed to bridge the gap. The only relevant ‘bridging’ action was taken by the Barroso government, when a closer inter-action and cooperation between the Ministries (and Ministers) responsible for science and enterprise policies was achieved.

Public-private partnerships (PPP) were introduced in CSF III, namely through the ‘Partnerships and Public Initiatives’ of POE. These were aimed at strengthening the involvement of private organisations, namely entrepreneurs’ organisations, in the carrying out of so-called ‘voluntaristic’ measures aimed at responding to some weaknesses of Portugal’s industrial fabric. The change of POE into PRIME corresponded to a new labelling of PPP, now called Company Partnerships, but also to an objective of increasing private involvement. The experience so far appears to be mixed, but there are some positive initiatives; a good example is the SHOEMAT project, on the development of new footwear materials and components as well as on new manufacturing processes. The mid-term evaluation indicates that such partnerships are a pioneering experience, which may explore the opportunities for a more decentralised institutional framework and contribute to overcome not just market failures, but also coordination failures.

Some initiatives were taken to combine funding from different sources. However, Structural Funds interventions accounted for the bulk of the budgets allocated to innovation.

Exhibit 11 provides information about the absorption capacity of RTD interventions in the context of objective 1 regions in Portugal. A breakdown by field of intervention is provided. Absorption capacity is expressed, in financial terms, by the expenditure capacity, that is, the ration between allocated and disbursed funds.

¹⁸ M.M. Godinho and V.C. Simões, *I&D, Inovação e Empreendedorismo*, Observatório do QCA, Lisboa, 2005.

¹⁹ See Quatenaire Portugal, CEDRU and TIS.pt, *Estudo da actualização da Avaliação Intercalar do Quadro Comunitário de Apoio 2000-2006*, Lisboa, December 2005

²⁰ Ibid, *Sumário Executivo*, p. 142.

Exhibit 11: Absorption capacity of innovation & knowledge measures

CODES	ALLOCATED	DISBURSED	EXPENDITURE CAPACITY
OBJECTIVE 1			
18 - Research, technological development and innovation (RTDI) - detailed information unavailable	121.852.387,33	52.762.710,94	43,3%
181 - Research projects based in universities and research institutes	257.550.477,83	109.931.388,60	42,7%
182 - Innovation and technology transfers, establishment of networks and partnerships between businesses and/or research institutes	77.913.196,52	23.723.287,79	30,4%
183 - RTDI infrastructure	154.229.354,66	18.946.226,24	12,3%
184 - Training for researchers	251.083.732,00	185.000.686,07	73,7%
TOTAL OBJ. 1	862.629.148,35	390.364.299,63	45,3%

The overall rate of expenditure capacity in the innovation and knowledge economy related programmes supported by Structural Funds was around 45%. This resulted, however, from significantly different expenditure (disbursed to allocated funds) ratios in the various fields. In fact, these ranged from 12% in RTDI infrastructures to 74% in training for researchers.

The figures should, however, be interpreted with care, for two main reasons. First, Exhibit 11 does not record all the allocations and disbursements in innovation and knowledge economy programmes; as mentioned in 4.1.1. above, the strict innovation definition followed leads to a focus on POCTI/POCI 2010 elements. Second, expenditure capacity is relatively low due to the mid-term reprogramming exercise. The addition of programming and effectiveness reserves led to an increase in the budget allocated to POCI 2010. – and therefore to an inherent drop in expenditure capacity. This is, as far as we can interpret, the main reason behind the very low expenditure capacity ratio found for RTDI infra-structures. Such an interpretation appears to be also consistent with the fact that a wider definition of the field of intervention leads to higher expenditure capacity levels.

The bottlenecks identified were mainly due to six problems: (1) programme change, sometimes stemming from political change, thus generating some confusion among beneficiaries, and entailing the closure of some measures; (2) gaps between advertising and regulation of measures; (3) excessively long decision periods, especially in the most popular measures (such as SIME and SIPIE), due to excess bureaucracy and insufficient resources of implementing agencies; (4) failures in the design of measures, as it happened with NEST and SIME Inovação; (5) excessive focus on a ‘financial’ perspective in the evaluation of some measures; and (6) demand behaviour biases, with a clear preference for ‘easier’ measures (namely the basic support to hardware acquisition) and less attraction towards measures involving ‘softer’ approaches.

Several fund shifting decisions were taken to respond to, or to influence, demand, and also due to changing political priorities. The most relevant led to the change and re-labelling in the OPs themselves. A recent experience, launched in the context of PRIME was the definition of sectoral or cluster focus, in order to stimulate projects more in line with the Technological Plan.

The most successful measures in terms of absorption of funds are the easiest ones, i.e., those that firms can apply without entailing a significant change in existing procedures. The best examples are broad-range measures, such as SIME and SIPIE, which have been used by firms to support investments projects. To increase demand for measures with a higher innovative content, committed efforts by implementing agencies are essential, as the case of NITEC has shown.

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

This section of the report analyses the effects and added value of the Structural Fund interventions in favour of innovation and knowledge during the current programming period. The analysis is based on two main sources namely: a) available evaluation reports or studies concerning Structural Fund interventions; and b) interviews and additional research carried out for this study. Accordingly, this section does not intend to provide an exhaustive overview of the effects or added value²¹ of Structural Fund interventions but rather is based on the examination of a limited number of cases of good practice. These good practice cases may concern the influence of the Structural Funds on innovation and knowledge economy policies (introduction of new approaches, influence on policy development, etc.), integration of Structural Funds with national policy priorities, promoting innovative approaches to delivery (partnerships), or measures which have had a particularly important impact in terms of boosting innovation potential, jobs and growth.

Both the initial intermediate evaluations carried out in 2003 and their updatings which were finalised more recently in December 2005, have highlighted many problems in what concerns the ability of CSF III in bringing about effective changes in the areas of innovation and the knowledge economy. The report «Estudo de Actualização da Avaliação Intercalar do Quadro Comunitário de Apoio 2000-2006» that summarizes the updatings of all sectoral and regional evaluations²² points out that:

“the problems of the Portuguese innovation system lie in the weakness of the connection and interaction between the S&T system and the business firms sector. This weakness is an outcome of a poor coordination between S&T, industry, employment and training policies”²³.

In short what is pointed out is that the design and implementation of CSF III lacked a systemic view of innovation. So, despite several advances being acknowledged, there is a general agreement in the evaluations that the policy approach that was followed was neither ambitious nor coordinated enough and as a consequence it has not been able to deal appropriately with the existing challenges.

One aspect that emerges from the analysis of the OPs more related to innovation and the knowledge economy is that in general they have been able to reach a good

²¹ A good definition is “The economic and non-economic benefit derived from conducting interventions at the Community level rather than at the regional and/or national level”. See Evaluation of the Added Value and Costs of the European Structural Funds in the UK. December 2003. (Available at : www.dti.gov.uk/europe/structural.html)

²² See Quatenaire Portugal, CEDRU and TIS.pt, *Estudo da actualização da Avaliação Intercalar do Quadro Comunitário de Apoio 2000-2006*, Lisboa, December 2005.

²³ Our translation.

performance in terms of the indicators that were initially selected to monitor their evolution. The problem here lies however in the fact that several of the most important strategic goals set for these areas were not adequately translated into the selected sets of indicators. Further, the report mentioned in the previous paragraph²⁴ points out that the recommendations of the intermediate evaluation of POCTI were not appropriately incorporated in its reprogramming, while the OP that was established to continue it (POCI 2010) put forward several other objectives which were not realistic given the fact that the “national innovation system needs prior structural adjustments”.

The interventions that have been carried out incorporate many types of measures and actions, providing a very complete portfolio of policy tools in the areas of innovation and the knowledge economy. Despite this, however, the analysis of the pertinent evaluation reports shows that the adopted measures can be broadly divided into two main groups. First, those which have an impact on short term competitiveness conditions of existing firms and industries (such as grants for purchasing new equipments etc.). Second, those involving a complex causality chain, and characterised by a longer term impact (such as the support for academic research provided by POCTI/POCI 2010). This means that other (‘intermediate’) measures addressing structural change and the acquisition of capabilities by business firms are missing or, at least, have not been pursued with the necessary intensity. It is clear that CSF III overall did not provide adequate answers to this sort of challenges. The final report we have been quoting²⁵ stresses the need that “in line with the new directions pointed out by the Lisbon Strategy, the strategic reference framework for 2007-2013 should firmly concentrate on the priorities which have to do with business competitiveness and the structural change of the economy”. This structural change refers mainly to promoting new high-tech, knowledge-intensive start ups together with other new business firms with high-growth potential, both through stimulating endogenous entrepreneurship and the attraction of new FDI projects.

Several specific instruments were proposed in order to alleviate the capital needs of innovative firms, namely tax relief on R&D²⁶, grants for joint R&D with academic institutions and support for contracting postgraduate students willing to carry out their research within business firms. But these measures were not able to overcome two critical problems. Firstly, they had not the capacity to reduce the shortcomings in the demand. In fact, several of these measures were among those few with a performance much below the programmed targets at the moment of the intermediate evaluations. Secondly, CSF III did not succeed in creating a sustainable venture capital sector able to address properly the needs of innovative firms²⁷.

The shortcomings that have been pointed out above create room for further expansion of support to certain types of measures. This includes particularly those measures which were identified above with a more ‘intermediate’ nature in terms of the envisaged period of impact. Examples of possible measures include: support to the

²⁴ *Ibid.*

²⁵ *Ibid.*

²⁶ These are addressed by SIFIDE, a measure outside the scope of OPs support by the Structural Funds

²⁷ Although one should have in mind the existence of environmental problems (such as cultural features, the level of development of financial markets and the low size of the market) that further hinder the development of venture capital business.

acquisition and development of technical, managerial, marketing and design competencies in SMEs; support to new start ups of higher knowledge intensity and high growth potential; helping new PhDs and other S&T graduates to be involved since early stages in that type of firms; creating the conditions for the private business sector, public labs and academic research to involve together in specific practical projects, such as in large national infrastructure investments; and facilitate the strengthening and internationalisation of venture capital activities.

Several cases of good practice in policies supported by Structural Funds may be identified, on the basis of policy evaluation exercises and analysis of current practice and performance. That is the case of IDEIA, the programme on R&D consortia, the programme for integration of PhDs and Masters in firms, and Ciência Viva ('Live Science'), on the diffusion of scientific culture among youngsters. We decided, however, to focus on a less well known and more recent programme, whose results so far are very encouraging – the NITEC programme.

Launched in 2003, NITEC is aimed at supporting the setting up of R&D teams in companies. Such R&D teams should include a maximum of three people (on what regards financial support) specifically focussed on activities concerning the internalisation and development of in-house technological competences. Incentives correspond to non-reimbursable grants which may amount up to 30 per cent of eligible expenditures. Incentive increases may be obtained in the following cases: territorial de-concentration, that is, location outside of Lisboa e Vale do Tejo region; SMEs; and linkages with S&T institutes for carrying out the R&D projects. Total incentives cannot exceed 50% of eligible expenditures.

This programme is managed by the Innovation Agency (AdI). AdI put a significant emphasis on the implementation of this measure and directly approached several companies to advertise the programme. The mid-term evaluation of PRIME has mentioned NITEC as a positive initiative. Therefore, AdI played a double role with regard to this programme: as promoter, attracting the interest of firms, and as evaluator, assessing the merits and shortcomings of the projects submitted.

The NITEC programme has not been so far object of a specific evaluation. Nevertheless the information collected provides positive indicators with regard to its implementation and take up by firms. The objectives of strengthening companies' in-house competences are being fulfilled. Until July 2005, there were 74 NITEC projects (in different phases) involving a total investment of 29 MEUR and an envisaged support of 12 MEUR. Available evidence suggests that firms have designed their NITECs with different objectives: (1) to carry out specific product development projects; (2) to absorb, internalise and upgrade external know-how; and (3) to focus on process development, streamlining design and manufacturing activities. Another positive feature of NITEC is its geographic coverage, since the assisted firms are scattered throughout all the regions of Portugal's mainland, with the exception of the most 'advanced' ones (Lisboa and Tagus Valley, and Algarve).

In sum, NITEC may be considered as a best practice for three main reasons. First, it addresses a relevant weakness of Portuguese firms – the lack of consistent R&D activities. By supporting the creation of a small R&D team, NITEC enables firms to bet on R&D on a sound basis, establishing a basis for further development. Second, NITEC shows that it is possible to encourage the take up of more committed intangible investments by firms. The commitment of the AdI team involved in NITEC promotion seems to have played an important role. Third, the NITEC initiative may be replicated in different contexts.

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

The main outcomes of innovation and knowledge measures in the context of CSF III (2000-2006) are summarised in the Exhibit 12 below.

Exhibit 12: Main outcomes of innovation and knowledge measures

Programme or measure	Capability	Added value
POCTI/POCI 2010	This OP has aimed at the creation of longer term capabilities. It has been mainly associated with a traditional “science policy” view. In the continuation of similar OPs from the two previous CSFs (which were CIENCIA and PRAXIS XXI), POCTI/POCI 2010 had most of its instruments designed and most of its resources geared to support the development of basic science.	In the continuation of the OPs that preceded it in previous CSFs, this intervention has helped to structure a modern infrastructure of the academic R&D system. A proper “research council” has been created and now the academic R&D units network benefit from a relatively stable financial support system, based on routine international evaluations. Further, and also in the continuation of the preceding OPs, POCTI/POCI 2010 has helped to strengthen the stock of advanced human resources available in the country, particularly at the PhD level. A third and more innovative contribute of this programme has been an interesting action in the area of public understanding of science, driven mainly towards students of secondary schools.
POE/PRIME	In contrast with POCTI/POCI 2010 this OP has been mainly oriented towards companies and may be considered to have shorter term goals. A very wide spectrum of measures has been proposed, dealing with different aspects of firms’ needs, but the success of each one of them has been diverse. In practice, most of the resources have been concentrated on actions of updating available capital goods, in the continuation of the PEDIP OPs of the two previous CSFs.	Since the initial drafts with the objectives and foreseen actions of this OP were published, the word ‘innovation’ has been present very often. However, this has not been enough to create a grounded culture and practice of innovation in Portuguese business firms, both on manufacturing and in the services industries. Despite the very significant resources employed in this OP it was also not capable of attracting a significant number of important projects (both national and foreign), helping to move the specialization towards higher value added and more sustainable activities. Further it has also not been effective enough in stimulating new high-tech, knowledge intensive start ups. Its contribution has mainly been a consolidation of the advances brought about by the two previous rounds of structural funds.
POSI/POSC	This OP targeted the promotion of the infrastructure and capabilities of the information society in Portugal.	The adoption and diffusion of ICT has advanced significantly in Portugal since 2000. Important investments in infrastructure have also been completed. However the effectiveness of this OP has been severely affected by delays in implementation, which have to do with shortcomings on the supply side but also with difficulties on the demand side, namely at the regional/local levels of implementation. Further, the pace of change in this area should have been higher yet so that catch up with the leading ICT adopting economies might occur in a reasonable time horizon.
Other sectoral OPs (agriculture, fisheries)	These interventions have aimed, in the areas which are the object of analysis of this report, at creating RTDI capabilities.	The fact that the attitudes towards R&D and innovation were not particularly favourable among the economic actors in these sectors was an initial severe hindrance to the effectiveness of the interventions. The scattered nature of these interventions also did not help to bring about the necessary changes.
Regional OPs	The scope of these regional OPs, in what respects RTDI, is very similar to the sectoral OPs of agriculture and fisheries.	Again the small scale of intervention, and particularly the fact that most of these interventions were not connected with an overall view on innovation and knowledge at the national level, hindered their effectiveness. The most positive outcome might have been the creation of an awareness of the relevance of innovation and technological change among the regional actors, both on the policy and business sides of local/regional systems.

Effectiveness → significant results achieved; good absorption and management performance, etc.

Added value of measures → reinforcement of national priorities, innovative approaches and solutions, institution building, etc.

It was pointed out in the analysis of this chapter of the report the lack of ‘intermediate measures’, between those aiming at very long term objectives and those aiming at shorter terms results. In what concerns ‘innovation’ and ‘knowledge’, the CSF that is now reaching its end was not successful in bridging about the necessary structural change (this includes the sectoral composition of the economy but also the emergence of high-growth new firms and upward moves of existing firms in their value chains).

Despite a good portfolio of measures, the successful implementation of many of them was hindered by demand shortcomings. These affected mostly the measures oriented towards the creation of advanced capabilities. So in practice the resources have been mostly concentrated on more conservative measures, which have an easier implementation.

Further, as it has also been pointed out above, there has been a lack of a systemic view on the policy making side. The limited coherence and integration of science and enterprise policies severely affected the capacity of developing such systemic perspective. The policies have continued to be built on a top-down perspective, without the involvement of economic actors in the definition of the policy agendas and priorities.

The fact that new National Strategic Reference Framework will be concentrated on 3 sectoral OPs (together with the regional ones), and also that the Technological Plan has an overall coordination based on the Prime Minister office, are positive signs that might be understood as a promise of greater coherence and potential emergence of a systemic view.

5 Regional potential for innovation: a prospective analysis

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

5.1 Factors influencing regional innovation potential

The challenges faced by Portuguese regions are double faced: a significant part of them corresponds to national challenges, while others are, in fact, region specific. Portugal suffers from significant hindrances that constrain its capability to respond the challenges raised by the knowledge economy: in education levels, in productivity performance, in lifelong learning, in high-tech manufacturing and in business R&D. These weaknesses are basically national, being felt throughout the national territory. There are, nevertheless, regional differences and imbalances. The problems raised by declining traditional industries are especially felt in the Norte and Centro region. In particular in the Norte region, clothing and footwear industries have a significant employment share. Some areas may be, to a large extent, characterised as mono-industry, as is the case of Vale do Ave (textiles and clothing) and Vale do Sousa (footwear). Both Norte and Centro regions have been affected by divestments in labour-intensive automotive components manufacturing. Simultaneously, however, there are dynamic clusters in more technology-intensive activities, such as telecommunications (Aveiro), software (Braga) and mould-making (Oliveira de Azemeis and Marinha Grande). The Algarve and Madeira regions have a strong focus on tourism, this activity accounting for at least 20 per cent of total employment. Regional concentration in tourism is a mixed blessing: it is behind the higher per capita GDP levels that Algarve and Madeira were able to reach in recent decades, but it also entails an excessive dependence and vulnerability to changes in tourism flows. Lisboa shows an increasing specialisation in services, and is facing the challenge to attract international service activities. This region concentrates most R&D expenditures. As indicated above, around 54 per cent of BERD and 51 per cent of GOVERD are performed in the Lisboa e Vale do Tejo region.

From an innovation policy standpoint it is true that for some less advanced regions the issues to be dealt with concern more technology transfer and diffusion strategies than significant investment in new knowledge creation²⁸. Especially for a small country like Portugal, a dispersion of knowledge creation efforts might be self-defeating, since in many instances the key problem is the lack of scale to engage in international cooperative efforts. This does not mean that regional initiatives should not be promoted. This should be a key element of innovation policy, together with a more committed clustering exercise, as is indicated for Norte and Centro in Exhibit 14. That is why we have argued that a combination of bottom-up and top-down approaches

²⁸ See European Policies Research Centre (2004), "Cohesion policy funding for innovation and the knowledge economy".

should be pursued. Two national problems which should be dealt with in this manner, with clear regional differentiation, are the encouragement of entrepreneurship and technology and strategy diffusion services to SMEs. The last should be a key tenet of a committed diffusion policy, to be carried out in articulation with technological centres. For less advanced regions (namely for Alentejo, Algarve and the Atlantic regions) the focus should be put on knowledge absorption and application, taking into account local economic structures, as mentioned in Exhibit 14. The same holds, however, for Norte, Centro and the peripheral areas of Lisboa, where technology diffusion and support services for SMEs should be developed.

Exhibit 13 provides a summary of the key factors influencing regional innovation potential.

Exhibit 13: Factors influencing innovation potential by type of region

Region	Main factors influencing future innovation potential
Centro Norte	<ul style="list-style-type: none"> • Capability to undertake structural change from low skill intensive manufacturing industries to more technology-intensive sectors • Efforts by relevant firms in traditional sectors to move upwards in their value chains, focussing on more knowledge demanding activities, as well as on the development of new business models • Capability to attract new, more skill demanding, companies and initiatives (including foreign direct investment) which may act as change levers • Dynamising existing clusters, namely around the excellence poles that exist, to pull more traditional actors • Strengthening of new development poles, based on more knowledge intensive activities and related to Universities (Aveiro, Braga) • Encouragement of public knowledge-creation by providing a further impetus to education and research organizations in these areas, and using existing success cases (such as Aveiro) as inducements for change • Promotion of life-long learning initiatives • Appropriate articulation of top-down and bottom-up policy approaches able to provide scale to local initiatives while addressing inter-regional innovation weaknesses (such as structural change, knowledge-based initiative, new business models, FDI attraction, strategic support to SMEs, specialised training...)
Alentejo	<ul style="list-style-type: none"> • Attraction of new business, domestic and foreign, to stimulate local economy and attract younger generation • Development of new specialisation areas, combining local advantages (climate, nature, natural resources) with more knowledge-demanding activities • Development of brand and knowledge-intensive agro-industries addressed to international markets, making increased use of applied research • Dynamising public-knowledge supply by strengthening the activities of local Universities and their linkages with local businesses, as well as by fostering linkages to the Lisboa e Vale do Tejo public knowledge basis • Exploitation of expansion <i>couloirs</i> along key road axes • Promotion of historical, cultural and ecological tourism; a cluster approach in their regard should be followed • Use of existing excellence poles as demonstrators of good practices • Encouraging entrepreneurial initiatives by young people as an instrument for attracting new cohorts of population • Promotion of life-long learning, combining knowledge society approaches with traditional local expertise
Açores	<ul style="list-style-type: none"> • Encourage local initiative, aimed at exploiting local natural resources and creativity at a global scale (this may be enhanced by the existence of a strong migrant community in North America) • Development of entrepreneurial capabilities in young population • Strengthening of specialisation poles with competitive advantages in international markets (natural resources, eco-tourism) • Direct public knowledge towards the valorisation of climatic conditions, natural resources and primary products • Emphasis on life-long learning for enabling continued employability of mature population • Development of broad band infrastructure for leveraging relatively good performances in 'learning families' and countervailing peripheral location weaknesses.
Algarve Madeira	<ul style="list-style-type: none"> • Promotion of new, more skill intensive initiatives to reduce the excessive dependence on the tourism industry • Promotion of cluster approaches aimed at upgrading existing tourism activities and increasing the value added content • Attraction of young, high-skilled migrants to improve service quality and foster new initiative • Improving professional capability levels (especially in Algarve), through better education and life-long learning • Strengthen the links between domestic economic fabric and Higher Education institutions, to enable the carrying out of specific research addressed to local economic problems • Further focus of 'public knowledge' activities towards environmental protection and urban revitalisation • Enhance the contribution of senior migrants to regional development by encouraging cross-fertilisation initiatives • Provision of support services to small local service providers to help them to innovate in business models and service quality

Lisboa	<ul style="list-style-type: none"> • Strengthening of strategic capabilities of the main players located in the region to respond to global challenges; this requires namely the provision of high-skilled graduates and post-graduates and closer linkages with research centres • Development of in-house R&D capabilities of firms • Encouragement of new entrepreneurial initiatives as well as of spin-offs from the big companies located in the region • Development of capabilities of knowledge-intensive service firms to enhance skills and compete in global markets • Cluster approach to strengthen international reputation and competitiveness of relevant service industries • Strengthening the linkages between Universities and relevant economic actors in the region • Development of innovation support services to SMEs, especially in the Oeste and Tagus Valley subregions, to strengthen regional cohesion • Innovation in location conditions (infrastructures, quality of life, mobility) for Lisbon to improve its competitive position in the European cities league
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5.2 A prospective SWOT appraisal of regional innovation potential

In what follows the Portuguese regions are analysed in 4 groups: i) Lisboa; ii) Norte and Centro; iii) Algarve and Madeira; and iv) Alentejo and Açores. This grouping does not coincide totally with the output for Portugal of the cluster analysis made on the 4 factors drawn from the factorial analysis. It has however some coherence. On one hand it takes into account the readiness and preparation of the regions for the knowledge economy. Lisboa is by far the Portuguese region closer to the knowledge-economy ‘paradigm’. The remaining regions face bigger gaps, particularly the last two groups. On the other hand, this grouping also takes into account regional specialization patterns, recent growth paths and general economic attractiveness of the regions.

Exhibit 14: Innovation and Knowledge SWOT

Lisboa	Opportunities	Threats
Strengths	<ul style="list-style-type: none"> ▪ This region concentrates most of the higher level tertiary functions in the country (knowledge-intensive sectors, many universities, public labs facilities, advanced medical services, and public administration technical activities) ▪ It also concentrates a great deal of the medium-high tech sectors that emerged in the 1990s(car industry and some electronic products) ▪ The decision centres of many ‘infrastructural’ services (banking, telecoms, air transport...) are located in Lisboa ▪ A great deal of high-tech start ups are also located in the region, but there is potential for improvement 	<ul style="list-style-type: none"> ▪ The region was not able to develop yet its specialization poles to a world class level; they have been accumulating capabilities, but they are not yet internationally recognized and known by distinctive supplies; this translates into a significant fragility that needs to be dealt with, in terms of consolidation and advancing further the existing competencies ▪ The development of the scientific infrastructure (new R&D units, good supply of new PhDs etc) has evolved without a proper connection and linkages with economic and social needs
Weaknesses	<ul style="list-style-type: none"> ▪ The territorial organization of the region lacks coherence; urban management has improved but is still poor; the region is yet below a threshold to attract more foreign businesses and also develop its tourism potential; ▪ Many improvements in infrastructures have happened but some are still poor (e.g. airport) ▪ Quality improvements are needed in educational and training institutions 	<ul style="list-style-type: none"> ▪ Despite its overall development the region is still marked by a significant dualism (in the skills of the active population, in the capabilities of firms and also in intra-regional economic contrasts) ▪ The region concentrates many highly skilled workers, but it also has yet a high proportion of low skilled workers ▪ Projects that are now in preparation may represent a threat for Lisboa’s autonomy in the Iberian context

Norte Centro	Opportunities	Threats
Strengths	<ul style="list-style-type: none"> ▪ Important assets exist in these two regions in terms of both entrepreneurship and an industrial culture ▪ They also concentrate some important tertiary functions (particularly in Oporto, but also in Aveiro and to a certain extent in Coimbra; Braga and Viseu), yet not to a similar extent as in Lisboa ▪ Around some of the newer universities (especially Minho) some start ups were set up over the last decade ▪ A governance structure (regional governing bodies, technical centres, business associations...) has been set up over the last two decades that will be helpful in promoting innovation policies 	<ul style="list-style-type: none"> ▪ The entrepreneurial class that emerged mainly in the 1970s has matured and apparently is losing its schumpeterian drive; ▪ Apart specific high-tech investments (Infineon is an example) these regions have shown a weak capacity to move towards higher-tech and knowledge-intensive activities ▪ Most of the leading firms in the dynamic clusters of these regions have not been able to adopt proper business models (this involves marketing, logistics, international supply chain integration, IPR management) ▪ Science has also evolved in these regions (as in Lisbon) without a significant connection to social and economic needs or priorities
Weaknesses	<ul style="list-style-type: none"> ▪ Several of the specialization poles that emerged since late 1960s seem to be locked in some types of low value-added products and poor managerial practices ▪ These regions were able to open up to external trade in previous decades, but they were not able to go beyond a relatively passive exporting stance ▪ Quality improvements needed in educational and training institutions 	<ul style="list-style-type: none"> ▪ The low skills of the workforce is the most critical aspect threatening the development of these two regions ▪ Strong development disparities exist between the coastal fringe and the hinterland of these regions

Algarve Madeira	Opportunities	Threats
Strengths	<ul style="list-style-type: none"> ▪ The touristic potential remains as the main asset of these regions ▪ The immigration of (mostly retired) foreign highly skilled professionals may be an opportunity to exploit 	<ul style="list-style-type: none"> ▪ The weight of mono-specialization is a threat to the sustainability of the growth path
Weaknesses	<ul style="list-style-type: none"> ▪ Environmental and urban management remains poor, despite improvements in recent years ▪ Strengthening the supply of 'public knowledge' directed towards local needs and the valorisation of regional assets may generate positive outcomes ▪ Quality improvements needed in educational and training institutions 	<ul style="list-style-type: none"> ▪ The low skills of the workforce is the most critical aspect threatening the development of these two regions ▪ Apart from a few large tourism sector businesses, there is a shortage of entrepreneurial initiative ▪ The qualitative diversity of the tourism sector supply may create problems in its external image and promotion (particularly in Algarve)

Alentejo Açores	Opportunities	Threats
Strengths	<ul style="list-style-type: none"> ▪ Important environmental resources have remained protected given, to a large extent, low growth and low 	<ul style="list-style-type: none"> ▪ Some investments planned on a quick return perspective may endanger the environmental resources (this applies

	<p>population density (particularly in Alentejo)</p> <ul style="list-style-type: none"> ▪ The development of local government in recent decades has brought a new sense of community ▪ A few cases of successful high quality niche productions may be exploited for demonstration purposes 	<p>mostly to Alentejo)</p>
Weaknesses	<ul style="list-style-type: none"> ▪ The scarcity of local dynamic private actors means that opportunities exist to foster entrepreneurship ▪ Strengthening the supply of ‘public knowledge’ directed towards local needs and the valorisation of regional assets may generate positive outcomes ▪ Quality improvements needed in educational and training institutions 	<ul style="list-style-type: none"> ▪ The low skills of the workforce is a critical aspect threatening the development of these two regions

5.3 Conclusions: regional innovation potential

Taking into account the analysis undertaken above and more specifically the identified differences in regional innovation performances and potential, six priority policy headlines were identified. These are the following:

Policy headline 1: Potential for the emergence of new private, knowledge-intensive actors in all regions

- The quality and intensity of new firms entering the competitive arena should be a priority of the regional policies. The number of new firms emerging in high tech sectors has been limited. An active entrepreneurship policy should therefore be a decisive tool for structural change. However structural change should also be pursued by attracting FDI and by stimulating existing business interests to diversify to more high-tech and knowledge-intensive activities.
- Relevant regions: New entrepreneurship promotion is a nation-wide challenge. Norte and Centro have displayed higher entrepreneurship potential, but this is often focussed on traditional, low knowledge intensive activities. Therefore stronger focus should be put on the emergence of more knowledge-intensive businesses in these regions, on the basis of existing knowledge poles and clusters. Lisboa should also be benefited by these policies (despite its ‘phased out’ status).

Policy headline 2: Potential for firms to build up capabilities and move upwards their value-chains

- This policy orientation applies to all regions even though different regional approaches will be required, having in mind the existing industrial structure. Improving companies’ capabilities and moving towards more value-added activities are needed for Portuguese firms to increase their international competitiveness and to respond globalization challenges. Portuguese firms should be stimulated to seek more active positions in international trade, adopt new marketing and logistic approaches, and to manage IPR properly.

- Relevant regions: Norte and Centro need to develop capabilities around the ‘dynamic factors of competitiveness’ (design, marketing, logistics, quality, namely). In Algarve and Madeira the effort of capability building should be concentrated on competencies needed to improve the quality of the tourism sector supply (managerial capabilities, ICT use, marketing, service quality and complementary services).

Policy headline 3: Potential for widespread diffusion of advanced technologies and managerial capabilities among SMEs

- A proper innovation policy shall integrate the diffusion perspective. This comprehends technology transfer, benchmarking and the access to external sources but also the promotion of commercial and organizational innovation among SMEs. The innovation diffusion policy is particularly needed to improve the capabilities and competitiveness of SMEs located in less advanced areas.
- Relevant regions: Innovation diffusion policy should be adapted to the conditions prevailing in the different regions. In Norte and Centro this policy should focus on the widespread adoption of advanced ICT tools, coordinated with moves towards the development of managerial capabilities and the adoption of participatory schemes of work organization. In Madeira and Algarve ICT diffusion should be seen as a priority among firms that represent the economic bases of those regions, together with the promotion of supporting activities. In Alentejo and Açores again ICT diffusion should be a priority together with technology transfer in the areas related to natural resources exploitation.

Policy headline 4: Potential for connecting public knowledge supply with the economic and social needs of the regions

- The science system has developed rapidly in recent years, particularly in Lisboa but also in Norte and Centro. However much of this growth has happened without a proper connection to regional needs. This should be sought namely through participation of economic and social interests in the definition of priorities for public R&D funding.
- Relevant regions: Again this recommendation applies to all regions, though with different emphasis. Even in the regions where University research is less dynamic (Alentejo, Algarve and the Atlantic Islands), a stronger focus on regional needs and on the exploitation of regional potential should be encouraged.

Policy headline 5: Potential for strengthening ‘systemic’ (intra- and inter-regional) connections between the actors

- The density of the (regional, national) innovation system(s) needs to be stimulated. The approach suggested in the previous headline may be a contribution in that direction. The exploitation of the complementarities between the different regions, in terms of knowledge supply and demand, and in terms of different regional specializations, should also be pursued. The adoption of a ‘cluster policy approach’ (meetings of actors on a sectoral, market or technology-area basis, to define agendas and launch initiatives) might also be another important instrument. This might help to integrate the

‘bottom-up’ and ‘top-down’ perspectives in the definition of national innovation policy priorities.

- Relevant regions: Apart from Lisbon, the regions where a systemic approach might be more successful are Norte and Centro. They have already a diversity of actors and some previous experience in promoting localized interactions. These experiences might be the basis for more ambitious initiatives.

Policy headline 6: Potential for upgrading human resources through lifelong learning

- The low skills and low levels of educational attainment have been diagnosed as a critical problem hindering future development. The growth in educational supply that occurred in recent decades has only partially offset that situation. The meagre quality of the supply associated with that growth, together with the low effectiveness of the training system, remain therefore as important problems to be dealt with. Simultaneously, lifelong learning should be promoted to counter some regions’ vulnerabilities.
- Relevant regions: In Norte and Centro, it is essential to improve the response to unemployment in traditional industries; in Algarve, it should enable an improvement in service quality and provide a means to counter the dependence on tourism; and in Alentejo, it is essential to improve the capabilities of a ‘greying’ population. More specific regional orientations on this area are provided below on section 6 of the report.

To conclude, one may underline that some of the policy headlines are transversal, trans-regional, while others mainly concern specific group of regions. We consider that without a set of transversal policies, the innovation potential of Portuguese regions is severely hindered. Such policies should focus namely on the following: stimulus to the emergence of new economic actors; innovation diffusion policies towards SMEs; development of more systemic connections among the actors; and improving education and life long learning. Having said this, different policy mixes will be needed in specific regions. In the Norte and Centro regions the main challenge is structural change. This requires the emergence of new firms (both domestic and foreign) carrying out more knowledge intensive activities, together with the moving upwards of ‘traditional’ industries firms in their value chains, and the strengthening and expansion of existing dynamic clusters. This requires, of course, the development of systemic connections and a strong effort in life long learning to enable workers mobility. In the tourism-focussed regions of Madeira and Algarve there is an innovation potential associated with upgrades in the tourism value chain, but also the possibility to mobilise new actors (including skilled migrants). Innovation diffusion and life long policies have a role to play in enabling and leveraging the potential for change. Simultaneously, stronger connections with public knowledge are needed, not just in terms of higher education supply but also regarding the carrying out of research projects addressed to regional needs. Finally, in the case of Alentejo and Açores, the innovation potential is mainly associated with the leveraging of environmental conditions and high quality niche productions. This requires not just the support to new business initiatives and the upgrading of the capabilities of existing companies but also the establishment of closer links among innovation system players, namely a stronger focus of public research activities in the exploitation of regional potential.

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

The analysis developed above indicates that the new round of Structural Funds support to Portugal should have a stronger focus on intangible issues while enabling a balanced interaction between national priorities and regional adaptation/implementation through a mix of top-down and bottom-up approaches. In terms of innovation and knowledge policy there is a clear need for enhancing the skills and capacities of the players as well as for encouraging the creation and development of more systemic connections among them. This should be a key objective for the next round of Structural Funds support.

More specifically, four main investment priorities emerge from our analysis:

- (1) There is a wide consensus that Portugal suffers from a severe deficit in education and professional competencies. This means that significant resources should be concentrated on this area. It should be recognised that past interventions have been relatively ineffective. The success of new initiatives requires therefore institutional and behavioural change. Interventions should be addressed to improve the educational levels of young population – requiring an upgrading and qualification of basic and secondary education and the extension of tertiary education, with a particular focus on science and engineering skills – as well as of those already in the labour market, through a strong commitment to life long learning and vocational training.
- (2) A second priority has to do with the innovative capabilities and behaviour of existing firms. For most SMEs this means adopting good quality practices (certification according to ISO standards namely) and improving their organizational systems. Extension and support initiatives should be designed with this objective. For the most dynamic firms this means to enhance their knowledge bases, to strengthen their technological, marketing, design, logistic and technological capabilities, to upgrade their position in industrial value chains, to manage or appropriately position in international value chains or to define new business models. Similarly, foreign affiliates should be supported in their endeavours to upgrade their roles and attract new initiatives in the context of multinational networks.
- (3) A third priority concerns fostering entrepreneurship and helping new actors to emerge. The attraction of FDI projects in promising product areas should be an objective. But also domestically new actors should be stimulated. National and regional objectives should be defined in terms of helping new start ups with specific characteristics (technology and knowledge based, high growth potential) to emerge and develop.
- (4) The last priority refers to the development of systemic connections among the actors, namely business firms, knowledge suppliers and public organisations. There is a clear need to strengthen the inter-actions in and between national and regional systems. A cluster-based approach of agenda setting should be implemented, both on a sectoral level and around specific promising knowledge

topics, enabling the exploitation and leveraging of existing potential. Such participatory mechanisms should be set up so that practical orientations for R&D and resources' allocation emerge.

So far there is not a draft National Strategic Reference Framework (NSRF). Such document will not be available before Summer, since it will be put forward with the content of the individual OPs. It is possible to consider however that two strategic documents presented by the Government – namely the *Programa Nacional de Acção para o Crescimento e o Emprego 2007-2013* (the 'National Programme for Growth and Employment', in connection with the Lisbon Strategy) and the *Technological Plan* – already lay the strategic basis for the NSRF.

But taking into attention those documents, one may question about the clarity of the strategic guidelines provided by them. In fact, the *Programa Nacional de Acção para o Crescimento e o Emprego 2007-2013*, although identified 18 priorities clustered around 3 axes (macroeconomic, microeconomic, and skills, employment and social cohesion) looks mainly like a list of measures whose coherence and linkages do not appear as evident. In what concerns the *Technological Plan* it defines three action lines (knowledge, technology and innovation) together with a set of transversal dimensions. However, it is not clear neither how the various actions mentioned in the *Plan* will inter-act, nor their respective priorities.

In addition to those two documents, there is a more important reference document for the next round of Structural Funds support: the Council of Ministers Resolution defining the key guidelines for drafting the NSRF for 2007-2013. This provides five strategic priorities, which are generally consistent with the four investment priorities that we pointed out above. Such five priorities are the following: enhancement of human resources skills; encouraging sustainable growth by increasing the territories' and companies' competitiveness; ensuring social cohesion.

Another dimension that might hint at the policy priorities over the next programming period are the large public investments that have been disclosed in recent months. It should be remarked, however, that, apart the interest in renewable energy sources, the two largest projects (the new Lisbon airport and the construction of two TGV lines) show very little potential (or no potential at all) for dynamising the innovation system. This is troubling since they will absorb the most significant share of the resources available for 2007-2013.

Efforts should also be pursued to enhance Portuguese participation in the *FP7*, both by research centers and by companies. Similarly, the involvement by networks of SMEs in the *Competitiveness and Innovation Programme* should be stimulated. Besides the opportunities opened in the sub-programmes on ICTs, and intelligent energy, the possibilities for using the 'Entrepreneurship and Innovation' sub-programmes as an additional leverage for promoting structural change in Portugal should be exploited. This might require a specific action plan for leveraging the Portuguese involvement in European programmes. This would require the building up of national 'platforms' in relevant thematic areas to enable the achievement of the required critical mass and complementarity to fully participate and profit from international networks.

A critical problem that has been observed is that when CSF OPs offer measures with different degrees of sophistication, the more demanding ones (in terms of the qualitative nature of the objectives, complexity of the competencies needed etc.) tend to generate very few applications by firms, while the opposite happens with the 'easier' measures. The allocation of further resources for innovation and knowledge shall consider this situation. The problem lies on how to create proper incentive frameworks for firms to become involved in the more demanding measures. The lessons of some interesting initiatives to stimulate demand for the more sophisticated measures over the current programming period may inspire new measures to be designed. One example is provided by NITECs, a measure aiming at the creation of research teams in companies, where the pro-active stance by the managing agency (the Innovation Agency) generated a significant demand. Another example, of more sophisticated and cooperation-requiring nature, is the launch of the GAPI network (a dozen of Industrial Property offices set up close to universities, business associations and Technology Centres) in which involvement of the National Institute for Industrial Property was key for the success of the initiative. One might add that the stimulation of demand shall not be exclusively based on new dedicated structures, which might imply new transaction costs and further bureaucracy. The use of private brokers and intermediaries might also be a possibility.

Portuguese science has been advancing rapidly and the rate of growth of internationally refereed publications etc. points out to a catch up with the EU average in this area in a period of about 10 years. In connection to this, universities have emerged as important national and regional actors in many respects. In contrast, the R&D capabilities in the business enterprises sector are feeble and remain underdeveloped. This has primarily to do with the economic structure (low weight of more technology intensive industries, absence of large industrial conglomerates).

That strong dualism may be seen and exploited as an opportunity. Proper coordination mechanisms and regulations should be set up to draw the universities closer to the societal needs. The fact that it was recently announced by the Prime Minister that large public projects will have to allocate a fraction of 0.5-1% of its total cost to R&D might be seen as a possibility to bring different actors (government, firms, universities, public labs) together to develop advanced knowledge in connection with existing problems. Other participatory mechanisms shall be set up so that most R&D financed by public funds is developed in accordance to economic, social and regional needs.

It makes sense to differentiate the innovation and knowledge policies according to the specificities of the seven regions. They have different levels of development and specialization patterns. Regional mechanisms of governance (particularly in Madeira and Açores, but also in the remaining regions) that were developed over the recent decades have shown the willingness and capabilities to promote territorially focussed policy measures and initiatives. The proximity to local businesses justifies that those structures are empowered with capacity in this area.

A balanced approach needs however to be adopted. The strengthening of the national innovation system remains a top priority. Several of the Portuguese "regions" do not have the needed critical mass to be properly understood as "European regions" by themselves. To a certain extent, Portugal as a whole, with its 10.6 million inhabitants,

might be itself seen as a European region in need of a coordinated action. As a matter of fact, each region does not have the diversity of actors and resources for developing proper innovation systems. A national perspective has to be followed to reach appropriate scale and a diversity of inter-actions might be accomplished. Further, the interests of local lobbies, aimed at ‘capturing’ resources to pursue ‘parochial’ and egoistic objectives, should be curbed. Additionally, many measures should be implemented by two or more regions together (e.g. the stimulation of a cluster with 2 or 3 poles nationally), what calls for mechanisms of inter-regional coordination.

The priorities identified above, together with the analysis developed, lead to the presentation of a set of strategic orientations.

6.1 Strategic orientations for Structural Fund investments in innovation and knowledge

Key conclusion 1: Stimulate the development of a systemic innovation policy, aimed at fostering connections among the actors in the national innovation system

There is a clear need for the dynamisation and strengthening of interactions among the different players involved in Portugal’s national innovation system. This is envisaged as critical not just for consolidating that system but also for introducing seeds for change and adaptation to a fast moving international environment.

Recommendation 1: Adoption of a transversal innovation policy, overcoming the traditional divide between science and enterprise policy, strongly investing on institutional change and encouraging initiative and cooperation

Public policy should be led by a ‘systemic’ approach, encouraging a creative dialogue between research and enterprise policies as well as between national and regional policies. The development of cooperation among the various actors, within public administration, among public and private actors, between research and education centers and companies, between national and regional organisations, among organisations from different regions, among companies with converging interests has to be actively promoted. Simultaneously, institutional change should also be fostered through policies addressed to cultural aspects which influence attitudes and behaviours *vis-à-vis* change and learning. This is a transversal recommendation irrespectively of the regions concerned. Since Portugal is a non-regionalised country, an integrated innovation policy should be defined at national level. The assignment of the responsibility of coordinating the implementation of the Technological Plan to a body placed at Prime Minister’s Office is an important step in the right direction. The Prime Minister should have a key role in coordinating innovation policy, as it happens in other European country such as Ireland and Finland (Science and Technology Policy Council). Also the fact that the governance structure foreseen for the National Strategic Reference Framework foresees 3 larger Operational Programmes (together with the regional ones) in substitution of the plethora of current Operational Programmes under CSF 3, is another measure in the right direction.²⁹ That shall allow for greater coordination between the different sectoral ministries. In the setting up of this governance structure, it shall therefore be avoided that within each of those 3 Operational Programmes “sub-areas” are created in correspondence to each of the

²⁹ See more on this below, on the Key Conclusion 5 and the ensuing recommendations.

existing ministries. If that happens the proper policy mixes will not arise, and the architecture that was proposed will be subverted in practice, with a return to the old formula of one Operational Programme per Ministry. This coordination between the sectoral policies is a prerequisite for public departments putting forward the needed systemic policies. These policies shall be inspired by the idea of giving to the private actors the possibility of participating in large, mobilizing agenda setting exercises.³⁰

Key conclusion 2 : Focus on intangible investments and human skills

Portugal has benefited a lot from Structural Funds support. This has played a key role in building a modern physical infrastructure. Portugal still suffers, however, from severe weaknesses in human resources and knowledge infrastructures. This should be the central area of intervention in the next NSRF. Without a significant investment in human resources skills, at all levels, Portugal's present and especially future competitiveness will simply be in jeopardy.

Recommendation 2 : Developed strong efforts in enhancing human skills at all levels

This recommendation leads to four sub-recommendations in four specific areas of intervention:

2a) To increase the quality of basic and secondary education. Instead of vague intentions of quality improvement based on regular evaluation exercises, specific quantitative targets in relation to qualitative aspects shall be defined. One important and ambitious target would be the country students being able to reach average EU values in surveys such as OECD's Pisa until the end of the new programming period;

2b) To continue the expansion of tertiary education, with a stronger focus on science and technology. The target should be that, until the end of the NSRF, the share of Higher Education to reach more than 30% of the number of 24-year old population, with at least 30% of them graduated in science and engineering areas.

2c) To pursue the efforts in post graduate education, namely in new PhDs training, defining science and engineering as priority domains, while encouraging the carrying out of doctoral research in companies' environment. Support should not be provided to advanced training to all disciplinary areas irrespectively of their strategic relevance. That has led in the past to an excess supply in certain areas and also to a rise in young PhDs unemployment in recent years. The exercises of clustering (suggested below in recommendation 6) might be helpful to define priority areas;

2d) To launch a very strong effort towards life long learning. Investments in professional training should be developed on a medium- to long-term perspective of the market demand for jobs. The working competencies of the active population is the area which hinders most Portugal in its efforts to reach proper competitive levels in the world arena, namely in view of the role played by the emerging economies. Specific targets for the number of hours of annual training that each worker shall benefit need to be set, to converge with the EU average within the time horizon of the programming period. Workers below the 50 year old threshold in particular need to benefit from investments in professional training. Further, mechanisms of quality assessment and guarantee of the effectiveness of that training need to be put into practice.

³⁰ See more on this below, on the Key Conclusion 6 and the ensuing recommendation.

Although these interventions are needed for the country as a whole, specific focus might be put at regional level. For instance, lifelong learning activities are especially needed in areas with an ageing population or facing structural change. In the Norte and Centro regions, where most of the industrial basis of the country is installed, namely the segments of lower technological intensity, training activities shall be directed towards developing new models of working organization. Most of the staff in small and medium sized manufacturing firms still operates under specialized, fordism-oriented organizational structures. These industries face the challenges of globalization with greater intensity. Therefore training activities need to foster the emergence of new, more participatory working models, together with training directed towards “dynamic factors of competitiveness” such as design and marketing. In the Algarve and Madeira regions training needs to be directed towards stimulating quality improvements in the activities around the tourism *filière*. Many examples of excellence already exist in this sector in Portugal, but on the whole the existing firms (hotels, restaurants and bars, golf clubs, other entertainment activities) need to move upward in their value chain, with a global effort directed to quality increasing. In the poorer regions of Açores and Alentejo, training shall be connected to a better use and exploitation of regional resources, being them the sea, agriculture, pecuary or the wind, sun, thermal and sea wave energies.

Key conclusion 3 : Promote structural change through the encouragement of the emergence of new, knowledge-intensive, enterprises

A key objective of the NSRF should be the renewal of the company fabric. At present, Portugal’s industrial structure and specialisation pattern are excessively biased towards traditional, low tech industries. This has to be changed if the country is to appropriately respond globalisation challenges. Such a change requires the emergence of new actors, domestic and foreign. Many of the existing actors have had a good track record in the past, namely in areas in which Portugal gained competitive advantage and world market share in the previous decades, but they have now reached a stage of their life cycle in which growth and development of new areas of competence are not seen as a priority by them. There is, therefore, a need to encourage the creation and development of new initiatives in more knowledge- and technology-intensive areas of high growth potential. This is critical to stimulate an upward move of both the existing industrial structure and the international specialization profile of the country. If that objective is not accomplished over the next programming period, Portugal will not be able to escape the trap of the current challenge posed by the emerging economies.

Recommendation 3 : Support the creation of new firms launched by young entrepreneurs and attract new foreign business with high knowledge intensity

Portugal has exhibited over the last decades a dynamic company demography. The large number of new ‘entries’ that exist every year has, however, been dominated by companies with low knowledge intensity. The emergence of a new cohort of entrepreneurs, namely young technical and managerial executives with some prior experience in businesses, and new S&E graduates, including masters and doctors, should be actively promoted (through tax benefits, financial support, incubation facilities). The annual launching of three thousand new companies with such characteristics should be a target to be set. Simultaneously, a pro-active FDI attraction policy has to be pursued to enable the location in Portugal of more knowledge intensive activities by foreign affiliates. Portugal needs to rise to a new, better

position in the competitive world market for capturing FDI, particularly new investment in more technology- and knowledge-intensive areas. These initiatives are relevant for all the regions, although they are mostly needed in regions facing structural change (Norte and Centro), and with declining population (Alentejo). However, one should not forget that attracting new players is closely associated with existing business environment conditions, namely the existence of local clusters.

Key conclusion 4 : Promote the modernisation and upgrading of existing companies to strengthen their competitiveness in international markets

Another tenet of structural change concerns the evolution of existing firms. There is a clear need to enhance their in-house capabilities (in technological, marketing and managerial aspects), to improve their positions in industrial value chains, to manage or integrate in international supply chains, and to adopt new business models. These actions should be mainly focussed on Norte and Centro (traditional industries) and Algarve and Madeira (tourism activities).

Recommendation 4 : Develop specific programmes for enhancing firms competitiveness and innovation, while differentiating according to the needs and capabilities of the firms concerned

This is an area where national and regional aspects should be articulated. Simultaneously, the involvement in different types of cooperation should be underlined. Actions might include the following, in the case of ‘ordinary’ technology-contingent SMEs:

- 4a) Stimulus to the adoption of quality management;
- 4b) Support to company strategy and technology audits;
- 4c) Support to the adoption of ICT systems;
- 4d) Help firms to develop their managerial, design, logistic and marketing capabilities, namely in terms of acquiring better placements in their respective supply-chains.

The Irish Innovation Management Programme, the Norwegian BIT (on the adoption of ICTs) and the Finnish Technology Clinics are good examples that might be taken in consideration when designing specific programmes in this area.

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

Key conclusion 5: A change in the governance model used in earlier CSFs is badly needed

It was mentioned in this report that the absence of a coordinated policy approach and the consequent ‘capture’ of OPs by specific Ministries seriously undermined the efficiency and effectiveness of innovation-oriented actions in the three former CSFs. A new governance model, where the top coordination functions are assigned to the Prime Minister, is considered to be central to respond the challenges faced. Simultaneously, the NSFR should be based on a few, broad spectrum operational programmes, addressed to transversal areas, relevant for several Ministries. This is translated into two recommendations:

Recommendation 5a: The number of nation-wide OP should be considerably reduced, and these should have a transversal nature³¹

We have already put forward this recommendation in an earlier report commissioned by the CSF Observatory³². It has been espoused by the Government, as indicated in the Council of Ministers Resolution (CMR) mentioned above. This provides for the creation of three ‘thematic’ OPs: (1) competitiveness factors; (2) human potential; and (3) valorisation of the territory.

Recommendation 5b: Creation of a NSRF coordination and strategic monitoring group under the chairmanship of the Prime Minister

Such a group should integrate all the Ministers dealing with matters covered by the OPs and the Managers of the four OPs suggested. The Group should meet on a regular basis (e.g. three times per year...), monitoring the implementation of the OPs, assessing inter-programme consistency, introducing the adjustments needed for improving OPs effectiveness and efficiency, and exploiting inter-programme synergies. This recommendation, however, has not been adopted so far. The CMR does not address this issue, although it recognises a need for enhancing governance efficiency.

Key conclusion 6: Define a balanced mix of national and regional interventions

Portugal is a small, non-regionalised country. Therefore, a basic tenet of the next NSRF should be the promotion of connections with a view to strengthen the national system of innovation. Having said that, it should be simultaneously recognised the need to exploit and leverage the knowledge and innovation potential of the regions, which encompasses region specific interventions as well as coordinated inter-regional actions. Specific mechanisms for encouraging and enabling inter-regional linkages should be designed and set up. The policy mix should, therefore, encompass a combination of bottom-up and top-down approaches, aimed at strengthening system linkages. The Danish programme on Innovation Consortia together with the Technology Clusters Programme developed in Walonia, are examples of good practice that should be taken into account.

Recommendation 6: Development of a participatory mechanism approach, based on sectoral and cognitive perspectives

‘Cluster meetings’ to which several dynamic actors representing different activity areas within each cluster are invited should be promoted. These meetings should be convened to identify projects and others initiatives. This sort of participatory mechanism is well suited for agenda setting, defining priorities and helping in identifying possible allocations of resources. It is also instrumental in creating networks of actors and helpful in increasing the density of the innovation system.

³¹ On top of this, region-wise OP should be defined, of course.

³² See M.M. Godinho and V.C. Simões, ‘*I&D, Inovação e Empreendedorismo 2007-2013*’ Relatório Final, ISEG, Lisboa, July 2005.

Key conclusion 7: Invest on more demanding actions, while developing new approaches to stimulate a more qualified demand for those measures

This is a key challenge for the next NSRF 2007-2013. Increased emphasis has to be put on more sophisticated measures, requiring a stronger knowledge and innovation commitment from economic players, namely firms. There is, however, a paradox here: while the guidelines for the new NSRF round strongly welcome innovation-focussed approaches, financial requirements (and execution targets and bonuses) work the other way round, implicitly encouraging tangible investments. Such a paradox has to be overcome. To solve the conundrum, a two-legged approach has to be followed, simultaneously acting on the two sides. This leads to two recommendations:

Recommendation 7a: The European Commission should define more balanced and flexible investments execution rules to positively discriminate the more innovative and risky interventions

If due action is not taken on this regard, OP managers will be very cautious in committing money to those measures which may have a stronger innovation potential but where demand is expected to be lower.

Recommendation 7b: Specific actions aimed at stimulating demand for more innovative interventions should be included in OPs

Such actions may take different forms, from the contractualisation of objectives with brokers and technology-support organisations and an increased cooperation with consultants to the launching of specific public and private partnerships and the specific commitment by managing agencies. Lessons from earlier successful initiatives, such as GAPIs and NITECs, should be taken into account. The UK experience on Innovation Clinics and the Irish Innovation Management programme might be taken into consideration.

Key conclusion 8: Specific policy measures addressed to the creation and development of networking and cooperation should be granted a significant role

Besides the clustering approaches mentioned above, public policies should be implemented in a way that might foster networking and encourage cooperation between different types of players in the NSI. Large public projects already announced by the Government may provide an interesting experiment field to foster innovation-oriented cooperation to respond to specific problems.

Recommendation 8a: The Government should assign 1 per cent of the expenditures incurred in large public investment projects supported in the context of the NSRF to related R&D activities

It is interesting to remark that, in line with the reasoning behind this recommendation, the Prime Minister has announced, on the 29th March 2006, in a Parliamentary debate on science policy, that between 0.5 and 1 per cent of the investments connected with the largest public projects will be assigned to R&D activities. The commitment to R&D activities might be formalised through specific contracts, parallel to the basic contract signed for the implementation of the public investment concerned.

Recommendation 8b: Efforts towards concentration of resources in R&D activities should be pursued

Efforts towards a re-organization of the public and university research system need to be pursued. At present most of the activities undertaken under those two types of actors are dispersed and do not reach appropriate levels in terms of critical mass. The re-organization needs however to be driven by criteria of strategic relevance of the activities. The national parliament and the economic actors shall have an active voice in this process. The temptation to implement that process only or mostly according to criteria of academic relevance shall be opposed. Available resources shall be assigned to new platforms and structures only if they meet certain strategic criteria of national or European relevance. The implementation of the Future Foresight exercise in Germany might inspire a participatory approach in defining medium-long term strategic objectives for research.

Key conclusion 9: Stronger effort should be put on innovation support services towards ‘contingent’ SMEs and new technology based firms

A proper innovation policy should not be restricted to a financial support perspective. Especially for smaller and newly-born firms, the provision of support services is essential for enhancing their strategic and technological capabilities, in the first case, and for overcoming the inevitable teething problems, in the second. Therefore specific support services should be designed for these kinds of SMEs.

Recommendation 9a: Develop the provision of regional extension services to SMEs

Such ‘extension services’ might be provided in connection with existing organisations, such as technological centres, training centres and business associations, although the creation of specific region-wise networks might be envisaged. The regional nature of such services should be combined with a broad country ‘template’, while inter-regional exchange of experience and approaches should be stimulated. This recommendation is in line with the proposal, included in the Technological Plan, of creating a National Network of Technological Services. The experiences of Finnish Technology Clinics and Irish Innovation Management initiatives are good examples that might inspire policy approaches in this area. On a different level the Dutch Innovation Vouchers might also be considered.

Recommendation 9b: Develop NTBF incubators

A central element of the effort toward the creation of new knowledge-intensive firms should be the provision of multi-service incubating facilities. Such facilities should not be limited to providing space. Their main advantage would be in the provision of managerial, strategic, marketing and complementary technological services, as well as in providing networking opportunities and references for financial support.

Exhibit 15: Summary of Recommendations on Investment Priorities

Region/Group of Regions	Strategic Focus	Priority Measures	Indicative Financial Resources
Lisboa e Vale do Tejo (the new region of 'Greater Lisbon' will not be eligible for the 'convergence' objective, but just for the 'regional competitiveness and employment' objective)	Strengthening international competitiveness on knowledge-intensive services	Programme focussed on the development of knowledge intensive services addressed to international markets (software, design, media...)	5-10 per cent of the SF allocations (including around 3-4 per cent for Oeste, Vale do Tejo and Lezíria do Tejo, which will be no longer part of the new 'Greater Lisbon' region)
	Development of companies in house R&D capabilities	Keeping the NITEC programme for the whole national territory	
	Innovation support services to enhance regional cohesion	Provision of regional technology and strategy extension services to SMEs, especially in Oeste, Vale do Tejo and Lezíria do Tejo	
	Improving the connections with other regions	Nation-wide programmes aimed at leveraging the contribution of knowledge assets located in Lisboa	
	Innovation in "location conditions" for Lisboa being able to improve its competitive position in European cities league	Improving urban conditions (urban infrastructures, quality of life, mobility) to make Lisboa more attractive as a location	
Algarve and Madeira	Promotion of new, more skill-intensive activities and upgrading of existing tourism activities	Increased selectivity in supporting tourism initiatives, with a view to induce an upgrading in terms of tourism segmentation and services provided	Around 5 per cent of the SF allocations (Algarve and Madeira are entering a phasing-out process, although Madeira benefit from an ultra-peripheral status)
	Direct 'public knowledge' towards meeting regional future challenges	Attraction of domestic and foreign investments in knowledge-intensive industries	
	Attract skilled immigrants and entrepreneurs	Strengthen the relationships between regional Universities research priorities and regional future challenges, namely in environmental protection and urban vitalisation	
	Promote life-long learning	Launching a programme for supporting knowledge intensive business initiatives by immigrants in the regions	
	Launch innovative approaches to develop new areas of specialisation	Development of incubators	
Alentejo and Açores	Direct 'public knowledge' activities to respond regional future challenges	Programme for keeping employability opportunities for people threatened by the changes in the dominant tourism industry	Around 15 per cent of the SF allocation
	Promoting local initiative	Establishment of incubators for new entrepreneurial initiatives	
	Promote life-long learning	Attraction of domestic and foreign investment for exploiting niche production	
	Capability to undertaken structural change	Strengthen the relationships between regional Universities research priorities and regional opportunities for developing and exploiting natural resources endowments	
	Upward movement of existing firms in their value chains	Encouraging local entrepreneurship namely in high-end niche segments associated to traditional products or the exploitation of natural resources	
Norte and Centro	Dynamising existing clusters and poles, as well as the supply of 'public knowledge'	Programme for stimulating skills adjustment and valorisation of traditional know-how in the internet age	These regions will concentrate most of the SF allocation (between 70 and 75 per cent of total)
	Combining top-down and bottom-up policy approaches	Attraction of new domestic and foreign investments towards more skill-intensive activities	
	Promoting life-long learning	Promotion of knowledge-intensive entrepreneurship	
		Development of incubators for new entrepreneurial initiatives	
		Further development of the DINAMO programme, aiming at the fashion industries Launching of similar initiatives in other sectors (ceramics and chinaware) Launching of clustering initiatives, betting on regional capabilities, based on existing knowledge (software, telecommunications, mould-making, automotive components) Designing programmes that define general national action templates with room for regional initiative (the Norte 2015 initiative provides a good example of a bottom-up approach) Programme for stimulating skills adjustment, enabling the reorientation of people employed in ailing industries towards new job opportunities.	

Appendix A Methodological annex

A.1 Quantitative analysis of key knowledge economy indicators

A 1.1 Factor analysis

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

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

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

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

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

Public Knowledge (F1)

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

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

Urban Services (F2)

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

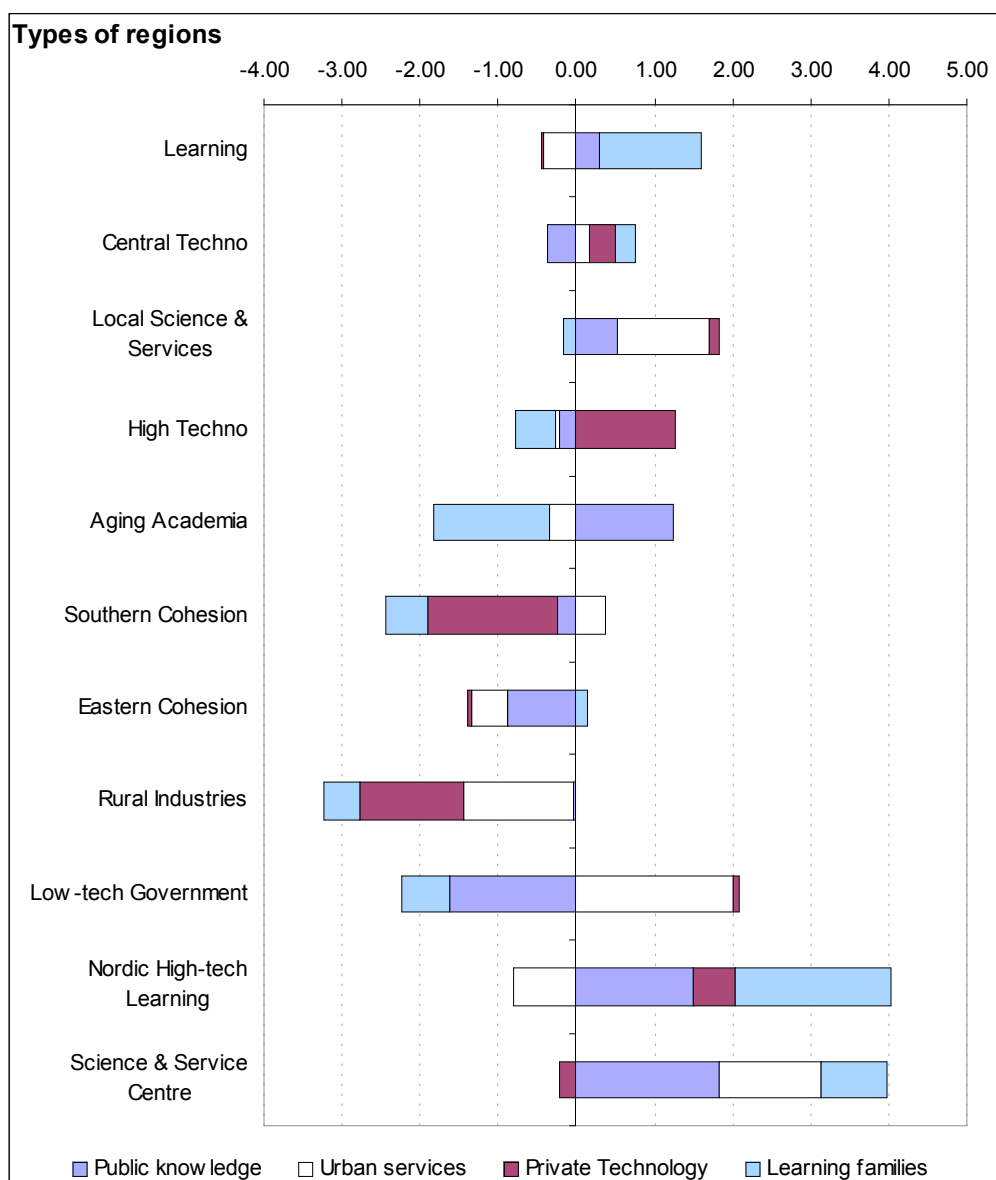
Private Technology (F3)

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

Learning Families (F4)

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

A 1.2 Description of the 11 types of EU regions



1 Learning

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

2 Central Techno

This is a rather large group of regions located mostly in Germany and France with close to average characteristic, but the share of High-tech manufacturing is rather high. The factor-scores as well as GDP-per head is slightly above the regional average, except for the Public Knowledge factor which is slightly lower.

3 Local Science & Services

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

4 High Techno

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

5 Aging Academia

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

6 Southern Cohesion

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

7 Eastern Cohesion

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

8 Rural Industries

Besides a low per capita GDP, Rural Industries regions have in common a low score on both the factors Urban Services and Private Technology. Population density is very low. The service sector is often very small. Especially agriculture but also manufacturing industries are relatively large sectors. Besides regions in Bulgaria and Romania and Greece, there is also a more nordic sub-group consisting of Estonia, Lithuania and Itä-Suomi

9 Low-tech Government

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

10 Nordic High-tech Learning

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

11 Science & Service Centre

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

A.2 Qualitative analysis and preparation of country reports

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

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

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

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

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

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

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

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

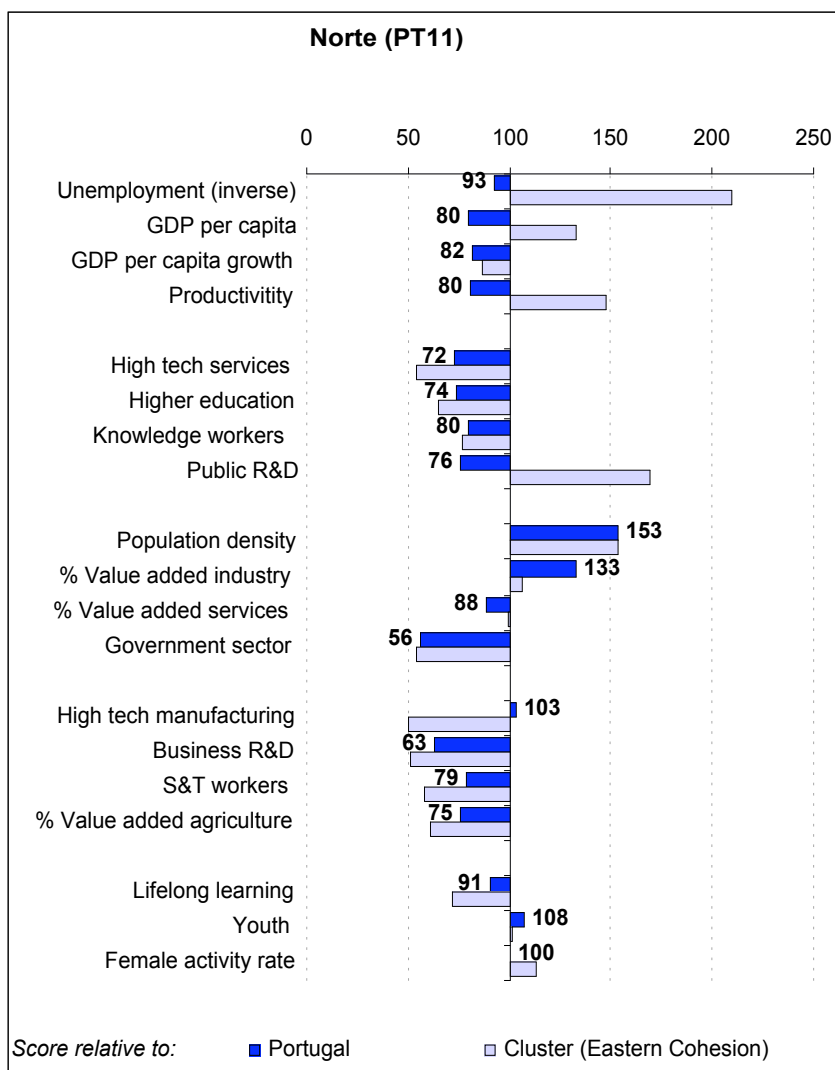
Appendix B Statistical tables and regional scorecards

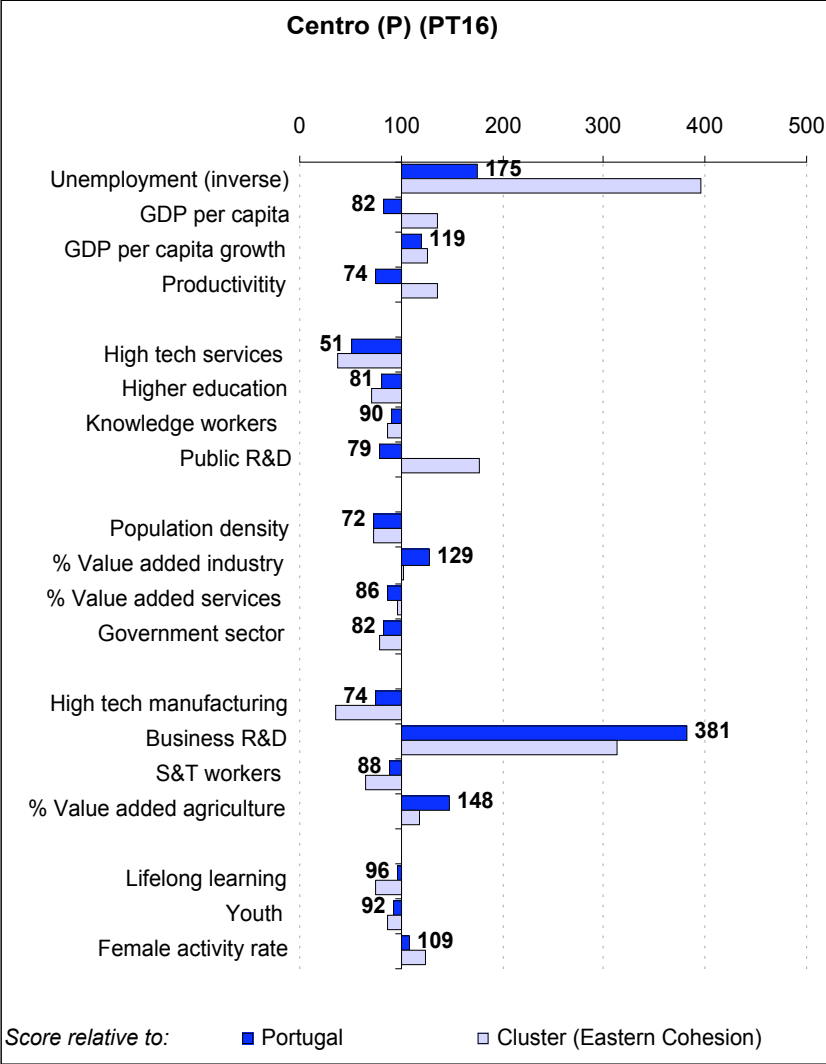
B.1 Overall quantitative analysis per region (Portugal)

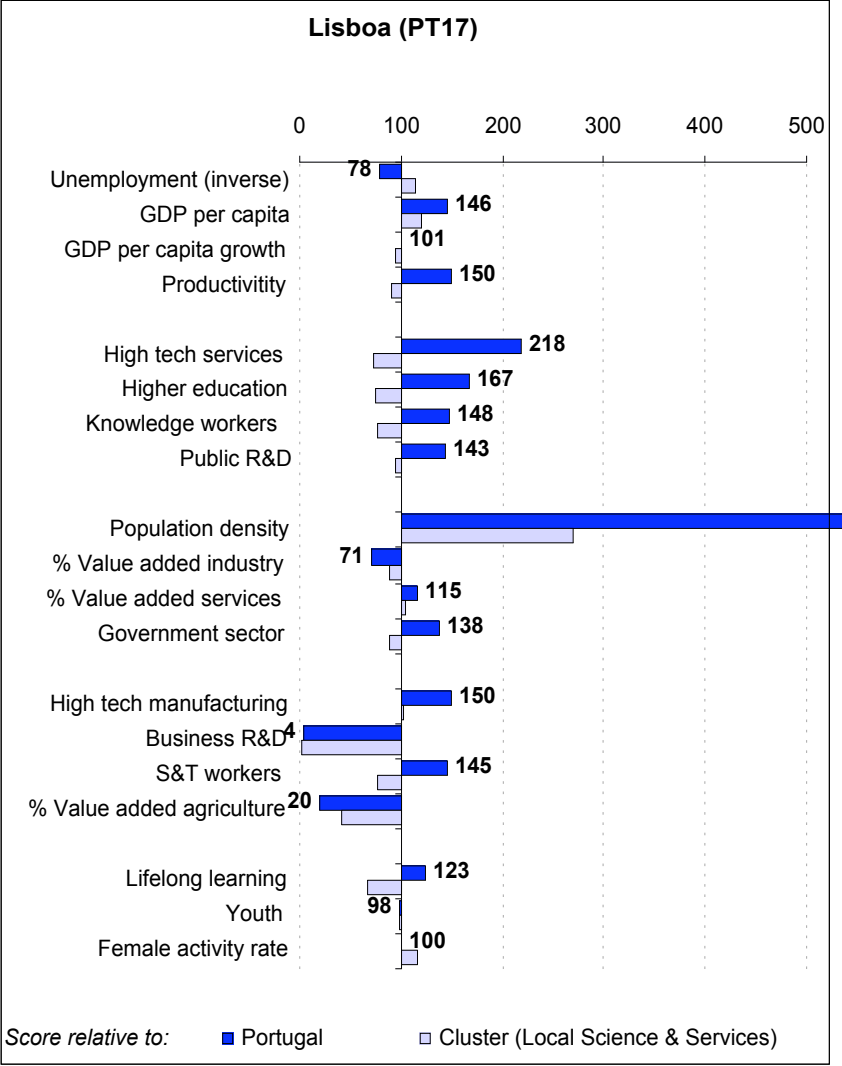
Cluster	Economic performance				Public knowledge				Urban services				
	Unemployment		GDP per capita	GDP per capita growth	Productivity	High tech services	Higher education	Knowledge workers	Public R&D	Population density	% Value added industry	% Value added services	Government sector
	2003	2002	2002	1996-2002	2002	2003	2003	2003	2002	2002	2002	2002	2003
EU25													
Regional average	9,2	21170	4,8	4556	3,2	20,7	11,6	0,69	117	27,0	70,9	7,5	
Portugal	9,4	18882	4,8	3914	2,8	18,9	10,7	0,49	294	28,9	66,6	7,6	
PT	6,3	16248	5,6	2260	1,5	10,5	7,0	0,58	113	27,3	69,1	6,3	
Relative to EU25	146	77	118	50	45	51	60	84	96	101	98	84	
Norte	6,8	13017	4,6	1814	1,1	7,7	5,6	0,44	173	36,3	61,0	3,6	
Centro (P)	3,6	13343	6,7	1671	0,7	8,5	6,3	0,46	82	35,1	59,6	5,2	
Lisboa	8,1	23665	5,7	3395	3,2	17,5	10,4	0,83	1049	19,4	79,8	8,7	
Alentejo	8,2	14084	5,9	2207	0,7	7,1	5,5	0,29	25	27,4	57,0	11,2	
Algarve	6,1	17170	5,8	2464	0,7	8,3	5,0	0,28	79	13,7	78,6	8,8	
Região Autónoma Dos Açores	2,9	13365	7,2	2167	0,8	0,0	0,0	0,54	102	17,1	73,0	12,3	
Região Autónoma Da Madeira	3,4	18968	9,1	2807	0,5	7,0	0,0	0,27	309	17,1	80,2	11,6	
Learning	4,3	23139	4,7	4900	3,2	22,1	12,5	0,40	216	30,5	66,0	6,0	
Central Techno	7,5	20700	4,0	4884	2,9	18,7	10,6	0,42	182	30,0	66,8	8,2	
Local Science & Services	9,2	19852	6,0	3780	4,3	23,6	13,7	0,88	389	22,0	76,2	9,8	
High Techno	6,1	25202	3,6	5591	3,1	17,5	10,3	0,58	288	31,7	66,7	7,3	
Aging Academia	13,3	17508	5,3	3649	2,5	27,4	13,2	0,67	185	30,1	66,9	7,6	
Southern Cohesion	10,7	16213	6,3	3082	1,2	14,7	8,2	0,37	66	19,9	70,0	7,5	
Eastern Cohesion	14,2	9776	5,3	1230	1,9	12,0	7,2	0,26	113	34,2	61,3	6,6	
Rural Industries	10,3	8204	5,6	1120	1,6	14,8	7,8	0,17	62	33,6	52,0	6,0	
Low-tech Government	14,1	18553	4,1	4848	2,3	10,0	6,2	0,55	161	21,2	75,1	12,9	
Nordic High-tech Learning	6,4	23323	4,7	5202	4,5	28,5	18,7	0,41	67	29,9	67,9	5,4	
Science & Service Centre	6,1	34489	5,3	6663	5,6	28,5	16,8	0,98	2118	16,8	81,2	7,4	

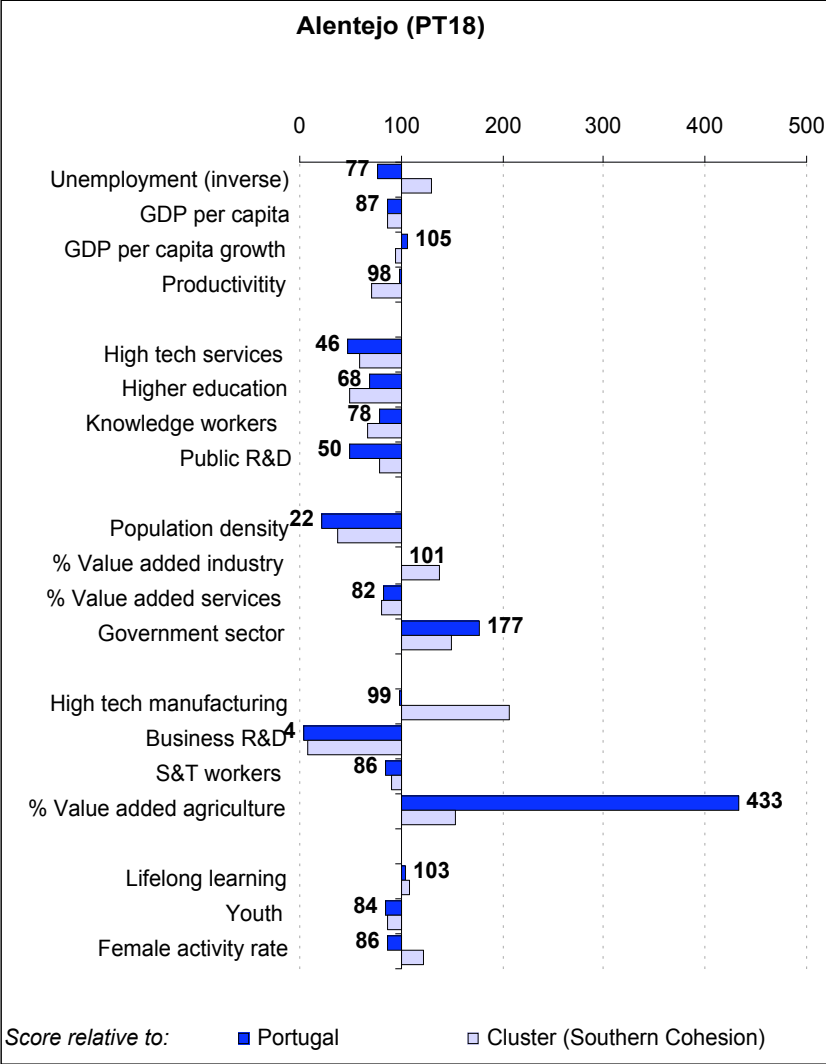
	Private technology			Learning families			Cluster factor scores					
	High tech manufacturing	Business R&D	S&T workers	% Value added agriculture	Lifelong learning	Youth	Female activity rate	Public knowledge	Urban services	Private Technology	Learning families	Per capita GDP
EU25	2003	2002	2003	2002	2003	2001	2003					
Regional average	6,6	1,24	20,7	2,1	8,7	10,8	48,3					
Portugal	6,5	0,80	19,5	4,3	7,1	10,5	47,3					
Relative to EU25	3,2	0,27	11,8	3,6	3,2	10,4	54,7					
PT	48	22	57	171	37	96	113					
Norte	3,3	0,17	9,3	2,7	2,9	11,2	54,9	-0,76	-0,98	-0,72	0,31	-0,78
Centro (P)	2,4	1,03	10,4	5,3	3,1	9,5	59,7	-0,34	-1,11	-0,71	-0,06	-0,73
Lisboa	4,8	0,01	17,2	0,7	4,0	10,2	54,5	0,10	1,31	-0,27	-0,10	0,63
Alentejo	3,1	0,01	10,1	15,6	3,3	8,7	46,9	-0,90	-0,19	-1,30	-0,80	-0,63
Algarve	0,1	0,71	9,8	7,7	3,3	9,5	50,7	-0,91	1,06	-1,51	0,03	-0,23
Região Autónoma Dos Açores	0,3	0,00	10,0	9,8	0,7	13,4	39,9	-1,78	1,76	-1,39	0,49	-0,73
Região Autónoma Da Madeira	0,4	0,05	10,9	2,8	0,7	12,1	49,8	-1,94	1,94	-0,92	0,72	0,01
PT30	6,2	1,12	22,0	2,4	15,1	12,2	53,8	0,29	-0,41	-0,04	1,30	0,56
Learning Central	7,5	0,84	20,7	3,1	6,7	11,2	47,6	-0,38	0,16	0,36	0,25	0,24
Local Science & Services	4,6	0,79	22,4	1,8	5,9	10,4	46,9	0,52	1,19	0,12	-0,17	0,13
High Techno	11,9	1,31	22,8	1,6	5,6	9,7	46,4	-0,21	-0,05	1,27	-0,52	0,84
Aging	6,7	0,57	18,8	3,0	4,8	7,4	46,0	1,24	-0,33	-0,02	-1,48	-0,18
Academia Southern	1,5	0,11	11,2	10,2	3,1	10,0	38,2	-0,25	0,36	-1,66	-0,54	-0,35
Cohesion Eastern	6,6	0,33	15,9	4,5	4,1	11,0	48,4	-0,89	-0,46	-0,05	0,15	-1,20
Rural	4,5	0,18	12,9	14,5	2,6	10,1	45,3	-0,03	-1,40	-1,33	-0,46	-1,41
Industries	4,2	0,28	16,2	3,7	4,6	10,1	32,4	-1,62	2,00	0,09	-0,61	-0,04
Low-tech Government	7,6	3,05	30,2	2,3	25,0	11,9	58,2	1,49	-0,82	0,55	1,98	0,59
Nordic High-tech Learning	3,8	1,00	30,5	0,8	12,8	11,4	55,5	1,82	1,31	-0,22	0,85	2,06
Science & Service Centre												

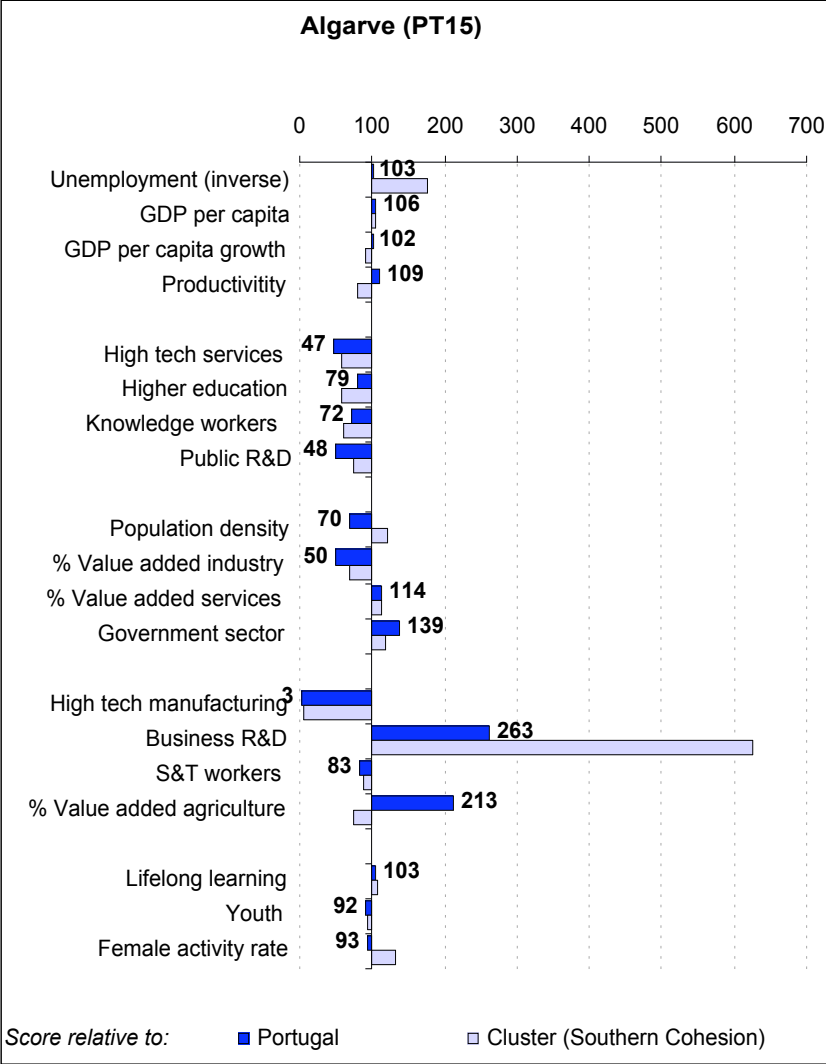
B.2 Regional Scorecards



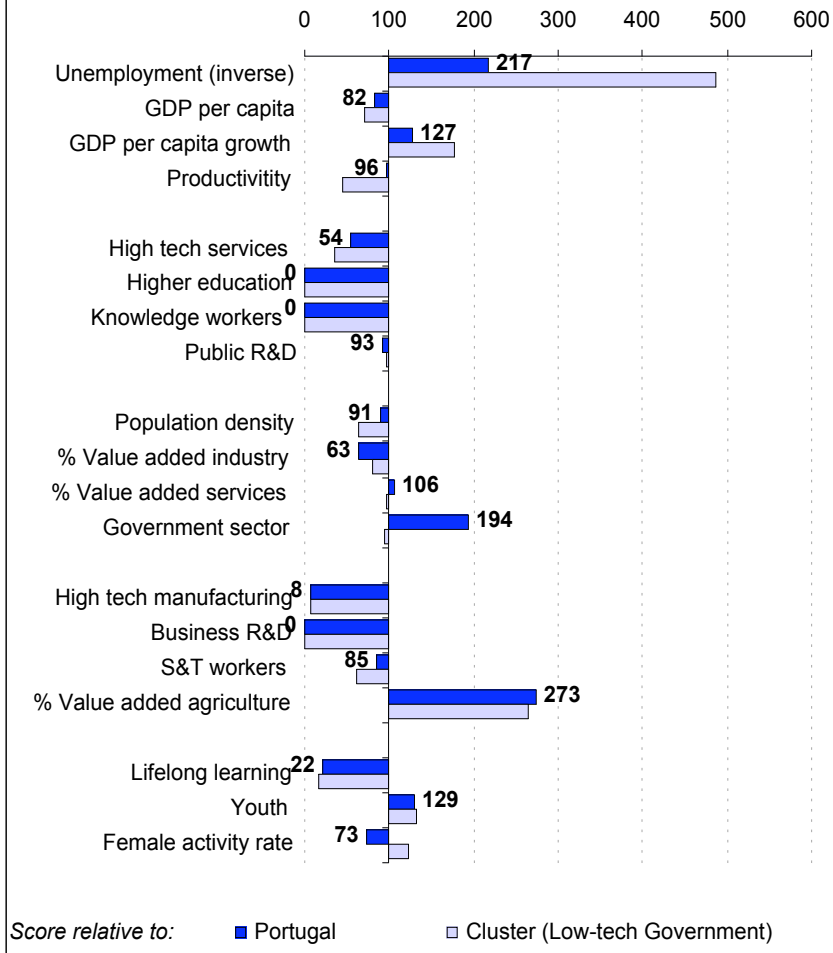




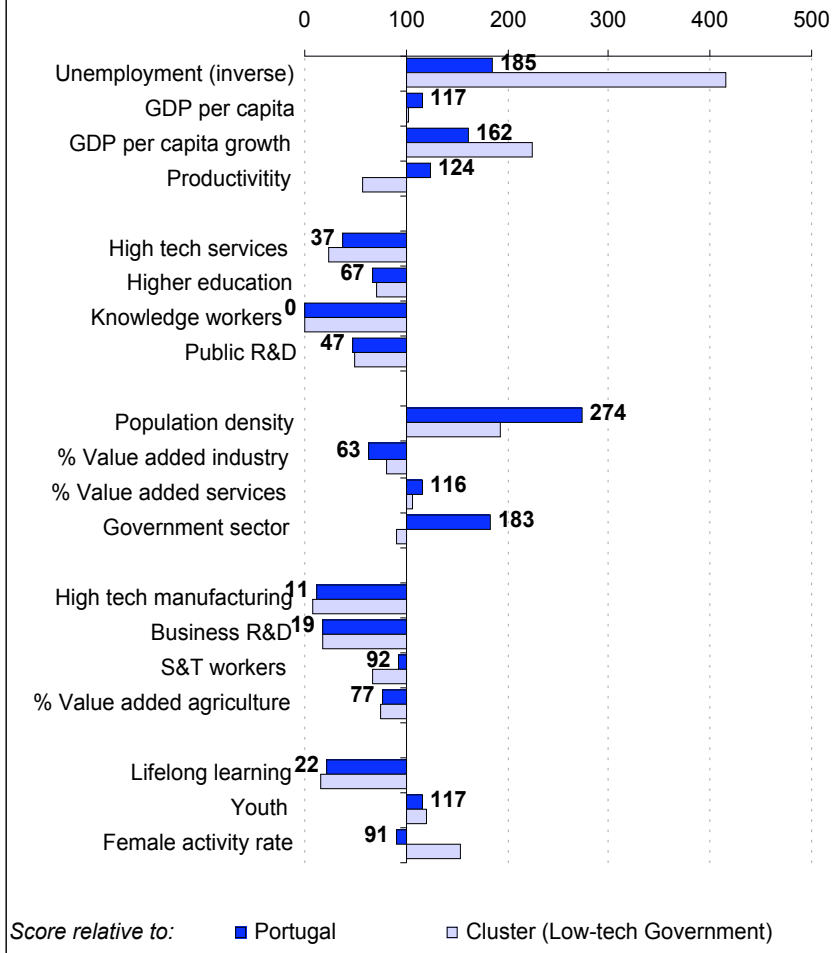




Região Autónoma Dos Açores (PT20)



Região Autónoma Da Madeira (PT30)



Appendix C Categories used for policy-mix analysis

C.1 Classification of policy areas

Policy area	Short description
Improving governance capacities for innovation and knowledge policies	Technical assistance type funding used by public authorities, regional agencies and public-private partnerships in developing and improving policies and strategies in support of innovation and knowledge. This could include past ERDF innovative action programmes as well as support for instance for regional foresight, etc.
Innovation friendly environment;	This category covers a range of actions which seek to improve the overall environment in which enterprises innovate, and notably three sub groups: innovation financing (in terms of establishing financial engineering schemes, etc.); regulatory improvements and innovative approaches to public services and procurement (this category could notably capture certain e-government investments related to provision of services to enterprises) ; Developing human capital for the knowledge economy. This category will be limited to projects in higher education aimed at developing industry orientated courses and post-graduate courses; training of researchers in enterprises or research centres ³³ ;
Knowledge transfer and technology diffusion to enterprises	Direct or indirect support for knowledge and technology transfer: direct support: aid scheme for utilising technology-related services or for implementing technology transfer projects, notably environmentally friendly technologies and ITC; indirect support: delivered through funding of infrastructure and services of technology parks, innovation centres, university liaison and transfer offices, etc.
Innovation poles and clusters	Direct or indirect support for creation of poles (involving public and non-profit organisations as well as enterprises) and clusters of companies direct support: funding for enterprise level cluster activities, etc. indirect support through funding for regrouping R&D infrastructure in poles, infrastructure for clusters, etc.
Support to creation and growth of innovative enterprises	Direct or indirect support for creation and growth of innovative firms: direct support: specific financial schemes for spin-offs and innovative start-ups, grants to SMEs related to improving innovation management, marketing, industrial design, etc.; indirect support through funding of incubators, training related to entrepreneurship, etc.
Boosting applied research and product development	Funding of “Pre-competitive development” and “Industrial research” projects and related infrastructure. Policy instruments include: aid schemes for single beneficiary or groups of beneficiaries (including IPR protection and exploitation); research infrastructures for non-profit/public organisations and higher education sector directly related to universities.

³³ This is part of the wider area of in-house training, but in the present study only the interventions targeted to researchers or research functions will be analysed.

C.2 Classification of Beneficiaries:

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

C.3 Classification of instruments:

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

Appendix D Financial and policy measure tables

D.1 Additional financial tables

D 1.1 RTDI plus business (innovation technology) support

Overall allocation of resources at an objective 1 and 2 level (allocated Euro)

Objective	Total cost	SF		NF		
		Total	ERDF	ESF	Public	Private
RTDI INTERVENTIONS						
Objective 1	5.020.956.177,20	2.171.584.667,67	1.916.307.719,67	255.276.948,00	1.288.518.104,41	1.560.853.405,12
TOTAL COHESION POLICY						
Objective 1	35.582.765.279,00	19.177.455.111,00	13.372.733.020,00	4.525.014.091,00	11.403.737.331,00	5.001.572.837,00

* the two digit code 15 was not taken into account to avoid overestimate (Lisboa e Vale do Tejo, PO Norte, Região Autónoma dos Açores, Economia).

** the two digit code 16 was not taken into account to avoid overestimate (PO Centro, Região Autónoma dos Açores, Economia).

Categories 181 to 184 plus :

- 152 Environment-friendly technologies, clean and economical energy technologies
- 153 Business organisation advisory service (including internationalisation, exporting and environmental management, purchase of technology)
- 155 Financial engineering
- 162 Environment-friendly technologies, clean and economical energy technologies
- 163 Enterprise advisory service (information, business planning, consultancy services, marketing, management, design, internationalisation, exporting, environmental management, purchase of technology)
- 164 Shared business services (business estates, incubator units, stimulation, promotional services, networking, conferences, trade fairs)
- 165 Financial engineering

D 1.2 Broad innovation and knowledge economy funding

Overall allocation of resources at an objective 1 and 2 level (allocated Euro)

Objective	Total cost	SF		NF		
		Total	ERDF	ESF	Public	Private
RTDI INTERVENTIONS						
Objective 1	5.493.736.134,57	2.453.204.510,83	2.197.927.562,83	255.276.948,00	1.463.226.600,77	1.577.305.022,98
TOTAL COHESION POLICY						
Objective 1	35.582.765.279,00	19.177.455.111,00	13.372.733.020,00	4.525.014.091,00	11.403.737.331,00	5.001.572.837,00

* the two digit code 15 was not taken into account to avoid overestimate (Lisboa e Vale do Tejo, PO Norte, Região Autónoma dos Açores, Economia).

** the two digit code 16 was not taken into account to avoid overestimate (PO Centro, Região Autónoma dos Açores, Economia).

*** the two digit code 32 has been included (Região Autónoma dos Açores, Sociedade de Informação). Figures may be slightly overestimate.

This third calculation adds RTDI plus business (innovation & technology) support plus information society. As D.1.1 plus:

322 Information and Communication Technology (including security and safe transmission measures)

324 Services and applications for SMEs (electronic commerce and transactions, education and training, networking)

D.2 Summary of key policy measures per programme

D.2.1. Main measures in favour of innovation and knowledge

Identified RTDI measure or major project	Focus of intervention (policy areas classification)*	Main Instruments**	Main beneficiaries***
Medium-term Finance Programme of R&D units	BC	Infrastructures and facilities, aid schemes	Public
Small Company Initiatives System – SIPIE	IFE	Aid schemes	Private
Company Modernization Incentive System – SIME	IFE	Aid schemes	Private
Industrial Property Use Incentive System – SIUPI	IFE, AR&D	Aid schemes	Mainly private
Integration of Doctors and Masters in Companies and Technology Centres	IFE	Aid schemes	Mainly private
Mobilising Projects for Technological Development	KT, AR&D	Aid schemes	Mainly private
Financial Innovation - Action A	IFE	Aid schemes	Public, Private
Financial Innovation - Action B	IFE	Aid schemes	Public, Private
Industrial Property Support Offices (GAPI)	KT	Infrastructures and facilities, education and training	Networks
Digital SME	IFE	Infrastructures and facilities, aid schemes	Private
Venture capital Syndication Funds	IFE	Aid schemes	Public, Private
Credit Enhancement Securitization Fund	IFE	Aid schemes	Public, Private
IDEIA Applied Research and Development in Companies	AR&D	Aid schemes	Private, networks
NEST New Technology Based Companies	CIE	Aid schemes	Private
NITEC Incentive System for Creating R&D Nuclei in the Company Sector	AR&D	Aid schemes	Private
DEMTEC Incentive System for Undertaking Pilot Projects Concerning Technologically Innovative Products and Processes	KT	Aid schemes	Public, private, networks
Programme for Supporting and Encouraging the Participation of Portuguese Organisations in the VI Framework Programme	AR&D, BC	Aid schemes	Public, private, networks
PRIME JOVEM - Supporting System for Young Entrepreneurs	IFE	Aid schemes	Private
SIME Inovação	AR&D	Aid schemes	Private
SICE - Incentive System on Firm Cooperation	IPC	Aid schemes	Networks
Support to the Creation of New Technology Infrastructures and to the present Technology Training and Quality Infrastructures	KT	Infrastructures and facilities, aid schemes	Public, private
Doctoral Grants in Companies	IFE	Aid schemes , education and training	Private
Training and Human Resources	IFE	Education and training	Private
SIPIE - Technology Based Firms	CIE	Aid schemes	Private
Centers of Excellence - Development of Competence Centres in ICT	IPC	Infrastructure and facilities, aid schemes	Private
OTIC - Technology and Knowledge Transfer Offices	IPC	Infrastructures and facilities	Networks
NEOTEC Initiative	CIE	Aid schemes	Private
SIED - System of incentives for the digital economy	IFE	Aid schemes	Private
InovJovem	KT	Aid schemes	Private
SIME (revised)	IFE	Aid schemes	Private
SIPIE (revised)	IFE	Aid schemes	Private
SIME ID&T	AR&D	Aid schemes	Private

* Classification of RTDI interventions: Improving governance capacities for innovation and knowledge policies (IG); Innovation friendly environment (IFE); Knowledge transfer and technology diffusion enterprises (KT); Innovation poles and clusters (IPC); Support to creation and growth of innovative enterprises (CIE); Boosting applied research and product development (AR&D); Investment in basic capabilities (BC). RTDI measures were assigned to types of RTDI interventions according to the characteristics of their impact. In some cases, a single measure has impact in two or more RTDI interventions. Only the main impacts were considered. (see appendix).

**Classification of instruments: Infrastructures and facilities; Aid schemes; Education and training.

***Classification of Beneficiaries: Public sectors; Private sectors; Networks

Appendix E Case study

Name of Case (related policy measure or action)
<p>NITEC – Núcleos de Investigação e Desenvolvimento Tecnológico nas Empresas (NITEC – Incentive System for Creating R&D Teams in Companies)</p> <p>This programme was launched in 2003, through the Ministerial Decree no. 441/2003 of 28 May. It is aimed at strengthening business enterprises in house R&D capabilities, through the granting of financial support for the creation of R&D teams in companies. Such R&D teams should include a maximum of 3 people (on what regards the financial support provided) and should be focused on activities concerning the internalisation of external technology and development of in house technological competences.</p> <p>At present, the NITEC programme applies to all the Portuguese regions, irrespectively of being an objective 1 or objective 2 zone. However, for some time, companies based on the Lisboa e Vale do Tejo region could not apply. This situation was changed in 2005, and companies in this region are now eligible for support. However, as it will be detailed below, companies located outside Lisboa e Vale do Tejo enjoy an extra 10 per cent in financial support.</p>
Brief history and main features
<p>NITEC is addressed at promoting companies' research, development and innovation in house capabilities. The rationale is to support the creation of small R&D teams as a basis for the development of fully flagged R&D departments in the future. In fact the acronym NITEC translates as "RTD units in firms".</p> <p>The main instrument of NITEC is the provision of financial support. Eligible expenditures related to the creation of R&D teams include namely the following: (1) employment of skilled people committed to the carrying out of permanent R&D activities (up to 3 people); (2) software and computers for technical and administrative support; (3) books and access to technical databases; and (4) technology transfer or acquisition agreements.</p> <p>The incentive corresponds to a non-reimbursable grant of 30 per cent of eligible expenditures, with a maximum of euro 200000. The rate of incentive may be increased in the following cases: R&D teams located outside Lisboa e Vale do Tejo (increase of 10 per cent); small and medium size firms (10 per cent); and projects to be carried out with the involvement of S&T organisations (10 per cent). The rate of incentive should not exceed 50 per cent of eligible expenditures.</p> <p>The main beneficiaries of the NITEC programme are companies, including SMEs. In fact, NITECs are aimed at strengthening companies R&D capabilities as well as at inducing them to launch research and development projects. The decision to provide support to the creation of R&D teams is based on a R&D plan involving projects leading to new products, processes and/or systems or to the introduction of significant improvements in existing products, processes and/or systems. Simultaneously, NITECs are envisaged as an instrument for strengthening the relationships between companies and other actors of the national system of innovation.</p> <p>As far as we know, the programme was designed on the basis of an assessment of the Portuguese situation (where companies R&D capabilities are generally very weak), and was not influenced by previous experience in other countries. The programme is managed by the Innovation Agency (AdI). AdI showed a very significant commitment to the development of NITECs, and directly approached many target firms to advertise the programme and to provide information on application conditions. In this context, AdI envisaged itself as playing a role in "helping (firms) to innovate". NITECs were considered as an instrument for changing existing routines</p>

and challenging firms' traditional low commitment to R&D and innovation activities. It seems that AdI has played a double role with regard to NITEC: as promoter, attracting the interest of firms; and as evaluator, assessing the merits and shortcomings of the projects submitted. In this context, it is interesting to remark that AdI organised in May 2005 the first 'National Meeting of NITECs', attended by 146 firms.

The NITEC programme was launched in the context of PRIME, the Programme for the Modernisation of the Portuguese Economy, and is expected to end by December 2006. However, available evidence suggests that the programme might be continued in the next National Strategic Reference Framework 2007-2013. Applications are subject to an evaluation and decision process which takes around 2.5 months. The granting of incentives is formalised through a contract between AdI and the promoter of the NITEC project.

In the context of Portugal, NITEC was a novel and welcome initiative. In fact, before NITEC, there were no programmes specifically aimed at setting up R&D departments in firms. Incentives were granted on the basis of projects. NITEC has the merit of directly addressing the organisational and human resources weaknesses of Portuguese firms by providing specific support to the setting up of long term R&D teams which may significantly change companies' innovation attitudes and behaviours. From this perspective, it may be argued that NITEC contributes towards the Barcelona 3% objective.

Main results

According to the information disclosed by AdI, by mid July 2005, there were 74 NITECs in different phases of maturation, involving an overall investment of euro 29 million and an envisaged support of euro 12 million. Several NITECs are already in full speed and contacts with those NITEC firms indicate that they have, in general terms, a positive assessment of the programme.

The NITEC programme has not been so far object of a specific evaluation. Nevertheless, the recent updating (late 2005) of the mid term evaluation of PRIME indicates that this has so far been a successful programme, namely on what concerns its take up by firms. Another positive feature of NITEC is its geographic coverage. As of July 2005, it was possible to find NITEC projects or teams in all the regions of Portugal's mainland, with the exception of Lisboa e Vale do Tejo and Algarve.

With regard to the impact of NITECs in firms, it is still too early to make a sound assessment. Nevertheless, available evidence is generally positive. It suggests that firms have assigned NITECs with different missions. Three main approaches may be identified for NITECs basic activities: (1) to carry out specific product development projects; (2) to absorb, internalise and upgrade external know-how; and (3) to focus on process development, streamlining design and manufacturing activities.

Reasons of success and conditions for repeatability

NITEC may be envisaged as a best practice for three main reasons. First, it addresses a relevant weakness of Portuguese firms – the lack of consistent R&D activities. By supporting the creation of a small R&D team, NITEC enables firms to bet on R&D on a sound basis, establishing a basis for further development. Second, NITEC shows that it is possible to encourage the take up of more committed intangible investments by firms. The commitment of the AdI team involved in NITEC promotion seems to have played an important role. Third, the NITEC initiative may be replicated in different contexts.

The main lessons to take from the still short (3 years) experience of the NITEC programme are as follows: (1) the relevance of the involvement of the managing agency (AdI) in providing information about the programme, mobilising companies

and specifically approaching interesting targets; (2) when companies perceive that incentive systems really address their needs, take up levels tend to be higher; and (3) the demonstration and snow-balling effects may be important in attracting new applicants.

Designed as a programme to encourage the setting up of R&D teams in companies in a low business R&D performer, as is the case of Portugal, NITEC appears to be suited for replication in similar contexts. Of course, transferability should be assessed on a case-by-case basis, having in mind the characteristics of the countries or regions concerned. Generally speaking, however, the NITEC programme appears to have a strong potential for replication.

Appendix F Further reading

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SPI, Relatório Final do “Estudo de Actualização da Avaliação Intercalar do Programa Operacional Ciência, Tecnologia e Inovação”, Porto: October 2005.

V.C. Simões, *Annual Innovation Policy Trends and Appraisal Report on Portugal 2004-2005*, 2005

V.C. Simões, *Annual Innovation Policy Trends and Appraisal Report on Portugal 2004-2005*, 2003.

List of useful websites at national or regional level

<http://trendchart.cordis.lu/scoreboards/scoreboard2005/index.cfm>.

http://trendchart.cordis.lu/tc_country_list.cfm?ID=27

www.portugal.gov.pt

<http://www.qca.pt/home/index.asp>

www.prime.min-economia.pt/

www.pocti.mces.pt/

www.posi.pcm.gov.pt/

www.adi.pt

www.unic.pt

www.fct.mct.pt

www.iapmei.pt

www.ccr-n.pt

www.ccdr-lvt.pt

www.ccr-alg.pt

www.ccr-c.pt

www.ccdr-a.gov.pt

www.gov-madeira.pt

www.azores.gov.pt

www.planotecnologico.pt

Appendix G Stakeholders consulted

Participants to focus group

Name	Position	Organisation
Abel Mateus	President	Conselho da Concorrência
António Alfaiate	Member of the Board	AIP
António Oliveira das Neves	Director	IESE
António Bob Santos	Advisor	CNEL PT
Augusto Mateus	Director	Augusto Mateus & Assoc., Lda
Carla Pedro	Invited Expert	Observatório QCA/GTQREN
João Guerreiro	Rector	Univrsidade do Algarve
Isabel Caetano	Project Manager	COTEC Portugal
Nelson de Souza	Manager	PRIME
Patricia Neto Martins	Planning Division	CCDR Algarve
Pedro Figueiredo	Project manager	CCDR-N
Teresa Jorge	Vice-President	CCDRC