OECD Reviews of Regional Innovation

PIEDMONT, ITALY

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Piedmont, Italy

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Foreword

The importance of regional dynamics in supporting innovation is widely recognised. Strong dynamics of innovation generation in regions are crucial for achieving national innovation policy objectives. In addition, innovation performance can contribute to improving the overall economic competitiveness of individual regions. Policy recommendations are therefore being sought by both science and technology and regional policy actors, as well as the regions themselves.

OECD countries and regions are nevertheless struggling with how to best promote regional innovation. How should national innovation policies take into account this regional dimension (*i.e.,* the importance of "place")? How can regional actors support innovation that is relevant for their specific regional context? This role sharing in a multi-level governance for innovation is a new area for OECD countries.

The OECD launched in 2007 the series *OECD Reviews of Regional Innovation* to address this demand by national and regional governments for greater clarity on how to strengthen the innovation capacity of regions. These reviews are part of a wider project on competitive and innovative regions through the OECD Territorial Development Policy Committee. This work also supports the OECD Innovation Strategy. The series includes both thematic reports and reviews of specific regions.

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ADiTe	*Associazione dei Distretti Tecnologici Italiani* Italian Technological Districts Association
AI3	*Acceleratore di Idee di Imprese Innovative* Accelerator of Innovative Firms' Ideas
ANACT	*Agence Nationale pour l'amélioration des conditions de travail* National Agency for the Improvement of Work Conditions
BERD	Business Expenditure in R&D
CASA	Urban Authority for Sophia Antipolis
CCI	*Chambre de Commerce et d'Industrie* Chamber of Industry and Commerce
CEIP	Piedmont Agency for Investment, Exports and Tourism
CIDEM	Centre for Innovation and Business Development
CIPE	Interdepartmental Committee for Economic Planning

CNR	*Consiglio Nazionale delle Ricerche* National Research Council
COMECON	*Consiglio per la Mutua Assistenza Economica* Council for Mutual Economic Assistance
COPCA	Consortium for the Commercial Promotion of Catalonia
CPER	*Contract de Projets Etat-Région* Contract for State-Regional Projects
CRIC	Centre for Research on Innovation and Competition
CRT	Cassa di Risparmio di Torino (Foundation) Torino Savings Bank (Foundation)
CSI	*Consorzio per il Sistema Informativo* Consortium for Informative System
CSP	Research, Development, and Experimentation of Advanced Computer and Telecommunication Technologies
DG XVI	Regional Policy Directorate of the European Commission
DIADI	*Diffusione dell'Innovazione nelle Aree a Declino Industriale* Diffusion of Innovation in Industrial Declining Areas
DIFUSE	Driving Innovation from Universities into Scientific Enterprises

DOCUP	*Documento unico di programmazione per le aree a declino industriale e rurale del Piemonte*
	Structural Funds Committee
ECIU	European Consortium of Innovative Universities
ENEA	Italian National Agency for New Technologies, Energy and the Environment
EPSCoR	US R&D institutional capacity support for under-performing regions
ERANet	European Research Area Networking
ERDF	European Regional Development Fund
ERRIN	European Regions Research and Innovation Network
ERVET	*Emilia-Romagna Valorizzazione Economica Territorio*
	Economic Development Agency of the Emilia-Romagna region
ESOF	Euro Science Open Forum
FTI	Flanders Technology International
GERD	General Expenditure in R&D
HE	Higher Education
HEA	Higher Education Association
HEI	Higher Education Institution

HESIN	Higher Education Support for Industry In the North
HuGeF	Human Genetics Foundation
I3P	Innovative Enterprise Incubator of the Politecnico di Torino
ICT	Information and Communications Technology
IDeA	US R&D institutional capacity support for under-performing regions
ILO	International Labour Office
IMEC	Independent Research Center in Nanoelectronics and Nanotechnology
IMHE	Institutional Management in Higher Education
INFN	Institute of Nuclear Physics
INPI	*Institut National de la Proprieté Industrielle* National Institute for Patents
INTERREG	EU-funded programme that helps Europe's regions form partnerships to work together on common projects
IRE	Innovating Regions in Europe
ISCED	International Standard Classification of Education
ISMB	*Istituto Superiore Mario Boella* Higher Institute Mario Boella
ISO9001	The International Standard for Innovation Process Management

IWT	The Flemish Institute for the Encouragement of Innovation through Science and Technology
KIBTS	Knowledge Intensive Business and Technical (Producer) Services
KITS	Knowledge Intensive Technical Services
KUL	The University of Louvaine
M&A	Monitoring & Analysis Unit of IWT
MANUNET	Trans-National Co-operative Network Part of the ERANet Programme
MIUR	Ministry of Education, Universities and Research
MKB	SME project
NIS	National Innovation System
NRW	North-Rhine Westphalia
NUTS-2	Nomenclature of Territorial Units for Statistics
OSEO	Union of ANVAR (French innovation agency) and BDPME (SME development bank), around a mission of general interest supporting regional and national policies
PACA	*Provence-Alpes-Côte-d'Azur* The Alps-Cotes d'Azur –Provence regions
PCB	*Parc Científic de Barcelona* The Barcelona Science Park

PRIDES	*Pôles Régionaux d'Innovation et de Développement Economique Solidaire* Regional Poles of Unified Economic Innovation and Development
R&D	Research and Development
RDA	Regional Development Agency
RIS	European-sponsored regional Innovation Strategy programme
RITTS	European-sponsored regional Innovation Strategy programme
RTP	European-sponsored regional Innovation Strategy programme
SCS	*Solutions Communicantes Sécurisées* Secured Communicative Solutions
SESAMES	Serving Subcontractors in the Automotive Sector
SME	Small and Medium Enterprises
SYMISA	The new name for the Science Park at Sophia Antipolis (changed in 1996)
SYMIVAL	Science Park at Sophia Antipolis
TEKES	Finland National Technology Agency
TFP	Total Factor Productivity
TOP	Temporary Entrepreneurs Scheme (the international standard for innovation process management)
TRIP	Trans Regional Innovation Project

TWDC	Torino World Design Capital
TWF	Torino Wireless Foundation
UAB	Autonomous University of Barcelona
UNE	Universities for the North East
UNICRI	United Nations Interregional Crime and Justice Research Institute
XPCAT	*Xarxa de Parcs Científics i Tecnològics de Catalunya* The Xarxa Scientfic Parks of Catalunya

Assessment and Recommendations

Introduction

OECD countries increasingly recognise the spatial dimension of innovation and are working to develop coherent policies to promote regional innovation

Regional innovation systems are important because: *i*) strong dynamics of innovation generation in regions are crucial for achieving national innovation policy objectives; and *ii*) innovation performance can contribute to improving the overall economic competitiveness of individual regions by increasing the productivity of firms. As such, the goals of regional innovation policy are relevant to policy makers from both the regional development and science and technology fields. This policy relevance appears to be increasing, not only in federal or regionalised countries such as Germany and Italy, where innovation policy has a strong regional focus, but also in countries with a more centralised policymaking tradition such as France, the UK and Japan.

OECD countries are nevertheless struggling with: *i*) how national policies to support innovation should take into account the regional dimension (*i.e*. the importance of "place"); and *ii*) how "regional" actors can take actions to support innovation that are relevant for their specific regional context. The place-based dimension of innovation has been documented in the literature to operate and produce benefits that can occur at many levels, such as a cluster, metropolitan area or region, and this variable geometry is not easy to address. The distinction between national and regional (sub-national) roles should therefore be based on which factors that support innovation are most susceptible to influence at which level within the governance context – a kind of subsidiarity exercise applied to innovation policy.

National level investment in innovation related activities often tends to reinforce the concentration of innovation activity in the nation's existing innovation hubs, potentially conflicting with regional policy objectives. How to manage this balance is an open debate in OECD countries. Support for innovation is often still focused more on science-led research and development (R&D), and relatively few member states have an explicitly spatial policy perspective for science and technology. Policy levers to support innovation in regions that are not innovation hubs are less straightforward. Such regions may be relatively less abundant in inputs of human capital, innovation infrastructure and firm competencies that lead to a lower absorptive capacity for innovation. However, a range of strategies have been used in OECD countries to help increase absorptive capacity, such as specialised network building support programmes (InnoRegio in Germany) or even R&D institutional capacity support for under-performing regions (EPSCoR and IDeA programmes in the US). These are, typically, expensive and require a high degree of selectivity to succeed, so are by no means a "model" approach suitable for replication across all non-core regions.

Nonetheless, innovation is now a core objective for most if not all regions irrespective of their economic profile and is integral to strengthening competitiveness and regional development. Supporting innovation does not necessarily imply a goal of economic convergence, but rather to build on the strengths in different regions for long-term competitiveness. The question is how to address the different kinds of innovation needs and capacities with both national and sub-national action. The review focuses on the specific challenges faced by the region of Piedmont.

Italy has reached a tipping point in its devolution process – in terms of powers and resources – to make sensible regional innovation policy a reality

The Italian regions have historically been very weak constructs – since the 1990s, there has been greater devolution, and according to a variable geometry, with much greater devolution to the special administrative regions, and two self governing provinces. Legislative Decree No. 112 of 31 March 1998 gave specific powers to the regions over the design and implementation of industrial and technological policies, but the national government reserved a number of powers at this time, including the right to define strategies and implementation guidelines nationally, and to retain the exclusive competence for research support. Constitutional Law No. 3 of 2001 expanded the powers and autonomy of the regions, by defining all competencies to either the state or regional level, or as co-competencies,

with a presumption that all non-reserved powers belong to the regions. There were three articles in this law that made regional innovation policy possible in Italy, devolving both the competencies for innovation as well as the resources to implement them.

Although the devolved powers in theory became available to the Regional Governments in the late 1990s, it was only with the second constitutional change of (2001) that there has been a serious attempt to engender regional innovation policy. The 2005 elections represented the first point at which new governments came to power promising to exploit the opportunities offered by these new powers. A number of newly elected regional governments were committed to using these new powers, resources and responsibilities, in the field of innovation policy, in Piedmont.

With this regulatory framework, the division of competences and the mutual collaboration between the national and regional governments was accomplished case by case. Therefore, the devolution process in the field of innovation policy has affected the Italian regions in different ways. Campania, for example, introduced a Regional Law on Research Policy as early as 2002, and is now approaching the end of its second three-year Research Plan. Emilia-Romagna, with a long tradition of pragmatic co-operative industrial policy, was an early adopter of innovation policy within European structural fund programmes. Lazio has established a wide ranging regional development agency that invests in high technology businesses as well as more traditional functions including inward investment promotion. Lombardy moved relatively late into Regional Research Planning, passing a law in 2007 to promote industrial competitiveness.

One of the main messages of this review is that the progress made in creating the constitutional possibilities for effective regional innovation strategies needs further work from national and regional actors if it is to achieve its economic transformative potential. The budgetary constraints faced by all levels of Italian government have hindered investment in the deep-seated structural and institutional changes necessary to effectively implement regionally sensitive innovation policies. There are clear efficiency gains to be achieved in this regard by more closely aligning national scientific investments with regional innovation priorities, greater leverage of private sector resources and reduction of transaction costs in current programmes.

Piedmont is a centre of R&D – especially business R&D – in Italy, whilst lacking the business services characterising Lombardy and Lazio to valorise that knowledge

Piedmont is – more so than other Italian regions – dependent on large firm centred production sectors, with a comparatively lower density of the small firm industrial districts which often characterise the Italian economic structure. The region has faced considerable pressures from globalisation in recent decades. Large firms in the region have shed jobs, reducing overall employment levels whilst increasing the value added of remaining positions. The region of Piedmont is probably most famous for its best known corporation, the FIAT motor company. The FIAT corporation has played an important role in the growth of Turin, its home city, as well as the region of Piedmont. Over time, the firm came to dominate the regional production system, which evolved to accommodate the needs of this powerful industrial actor. The region is also home to a number of other large, successful and globally competitive businesses including *Alenia Aeronautica* (aerospace), Lavazza and Ferrero (agro food), Zegna (textile), as well as a number of highly innovative SMEs such as Novamont and Mondo operating in chemistry and new materials fields.

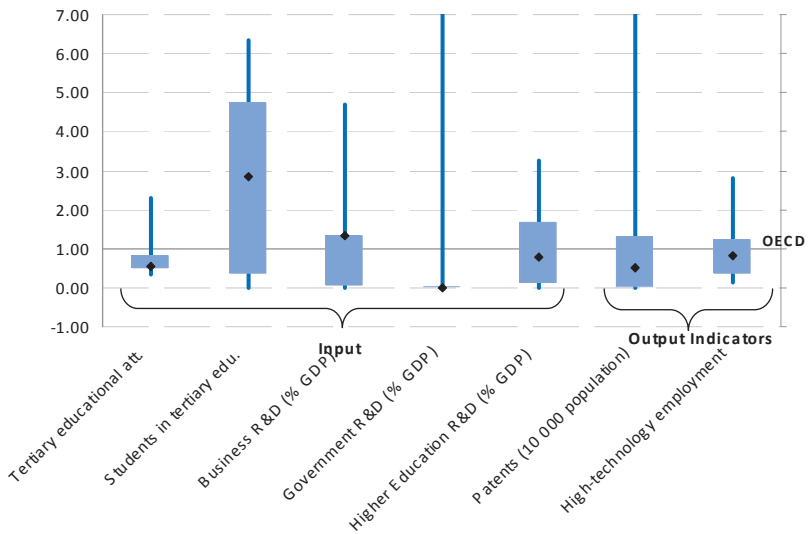
Small firms have traditionally relied upon those large firms as major customers, so their downsizing has placed the region's industrial districts under increased economic pressure. Whilst the year-on-year changes might be relatively small, the longer term trend has gradually emerged with the region locked into a downward economic path, as its comparatively high GDP levels have slowly but surely converged downwards towards the Italian and European averages. The region has not been abandoned by its traditional industrial base, so the challenge is not to create entirely novel economic sectors. Neither does the region have all the necessary foundations in place to sustain its position as a leading region in an Italian and European context.

Piedmont faces the challenge of reversing an almost imperceptible economic decline, a long-term trend only recently accepted as reality by key regional policy makers. The main cause of this has been a slow "hollowing out" of regional production activities by firms across Piedmont's manufacturing base. Although these sectors have long driven the region's economic development, their contribution to cohesive regional economic growth is slowly dwindling. Nevertheless, many of these firms – and in particular their investments in research and development (R&D) – are vital to the future of the region. Piedmont remains one of the hot-spots of private

investment in Italian R&D which offers a potential to reverse this declining economic competitiveness.

The locus of the reforms in Piedmont has emphasised building up a new RIS to bring some coherence to a very wide range of innovation activities, networks and partnerships already under way. The programme for government for Bresso-I is entitled "An open, tolerant, innovative Piedmont" (*Un Piemonet aperto, tollerante, innovativo*), with "an efficient and friendly regional machinery" the central focus for administrative reform (Piedmont Regional Government, 2005). This document reaffirmed the commitment of the Region to hitting the so-called Lisbon target of 3% GERD in GDP. The Regional Research Plan is seen as being the major regional contribution to successfully achieving this target.

Figure 0.1 **Piedmont's investment and performance in high-technology sectors in Italian (bar) and OECD (line) comparison**



Source: OECD Regional Database.

Piedmont faces the challenge of dealing with its industrial restructuring, whilst attempting to build new high technology and high employment sectors. But policy makers have not found it simple to promote innovative activities in this region. There are many businesses which are active in innovation, and there is a very strong research base in Piedmont's universities and public research laboratories. But what is missing appears to be collaboration and interaction between the various sectors. There is

negligible exchange of personnel between universities, research laboratories and the private sector. Traditional indicators of innovative activity such as high-technology entrepreneurship, patenting, R&D expenditure are low in international terms (although relatively high in an Italian context).

National policies to support innovation in regions

In Italy, there is a clear split in responsibilities for innovation policy between the national level (research) and the regional level (exploitation)

The Italian national state has sole competence for activities in the field of basic research and so national science and technology policy decisions play a strongly shaping role on evolving regional innovation system. The national government also has an interest in innovation policy through the valorisation and exploitation of these investments in knowledge capital. There have been three main strands to Italian national innovation policy in recent years (OECD, 2007b):

- **Systematic and strategic investments**. The government has sought to increase traditionally low levels of investment in R&D in a focused and responsible manner. The novelty of these kinds of investment has led to the adoption of a national strategy for R&D policy, ensuring that investments are co-ordinated and directed towards addressing poor national R&D performance.
- **Selection of key priority areas**. Much emphasis has been placed on identifying the priority sectors to direct innovation funding selectively towards, and on novel instruments to help build critical mass and global strength in emerging strategic areas, sectors and poles. These key sectors are required to be those sectors with a capacity to drive transformation and modernisation across the Italian economy.
- **Promoting interaction between innovators**. The Italian system is characterised by innovation within SMEs that have relatively few connections to universities, research centres and the banking system. The government aims to improve valorisation by stimulating partnerships between knowledge generators and knowledge exploiters along with those that can help with interaction, knowledge transfer and strategic co-ordination between the sectors.

One area of state intervention in the field of innovation policy has come through the designation of 25 Technology Districts. These were designated nationally on the basis of fulfilment of three criteria, namely the presence of industry (including an SME network), a strong university and industrial research base, and a functioning governance system. These districts seek to support knowledge exchange between actors within these specialised innovation systems at the region level. These Districts are at different stages in their establishment, but it is true that it is primarily those districts in regions with operational innovation policies that have managed to create functioning Technology Districts.

The technological district initiative has been relatively successful, and there is an undeniable link between regional innovation policy experience, and the delivery of the national Technology District policy. This highlights the inter-dependence of these two layers in the multi-level governance of innovation policy in Italy. It is vital to identify all the areas where closer connections between national and regional policies can be created to improve the efficiency and efficacy at both levels.

There are several points of contact between national and regional levels – both institutions and activities – but alignment across the two levels is weak

There is a formal organ through which the Italian regions interact with the national state, the *Conferenza Unificata Stato-Regioni*, the State-Regions conference. This is an opportunity for dialogue between the state and regions on policies, which aims to support co-ordination between these various tiers. The State-Regions Conference:

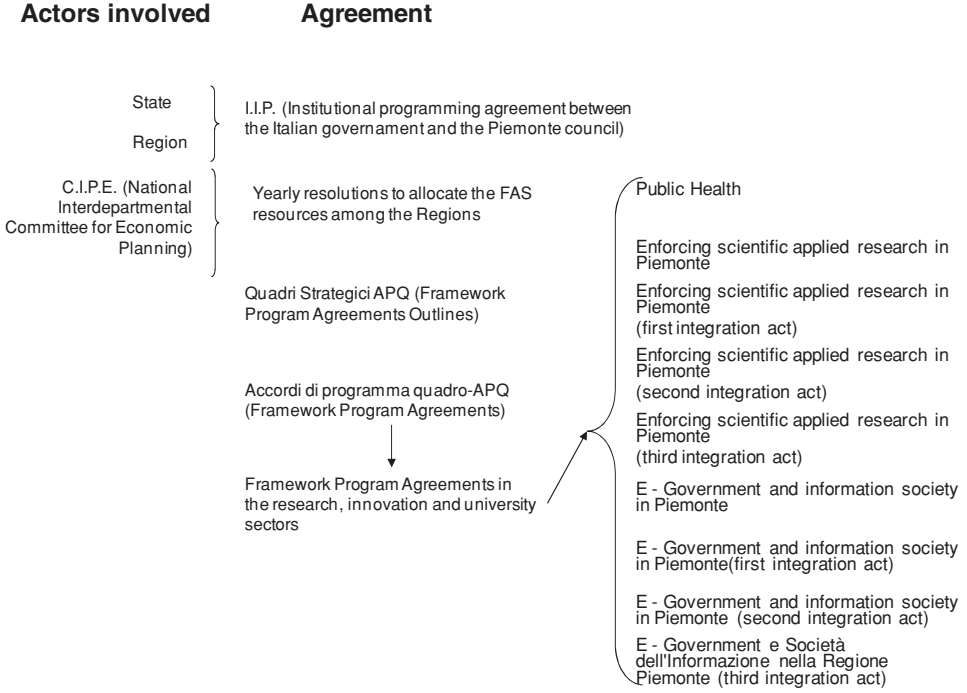
- Provides opportunities for the Government to take soundings from the Regions on the most important administrative and normative acts that interest Regions themselves.
- Attempts to foster close collaboration between national and regional administrations.
- Holds appropriate meetings as necessary to discuss any aspects of European Union policy concerning Regions and Provinces (*sessione comunitaria*).

The State-Regions Conference was created in 1983. Its powers have been expanded from 1997 on to deal with problems arising from the increasing devolution of power to the regional tier. This body became

particularly important after 2001, when changes to the Constitution meant that it became the leading co-ordination mechanism between the State and regional levels.

Perhaps unsurprisingly, the overlapping responsibilities between national and regional Governments for innovation policy have meant that there are a number of agreements negotiated between these two levels to give coherence to their collective activity. At a national level the Interdepartmental Committee for Economic Planning (CIPE) approved in 2002 the guidelines for the national policy for economic development; the CIPE guidelines constituted the main reference document for the elaboration of the Piedmont Research Plan. This is shown in the Figure 0.2.

Figure 0.2. **Framework agreements negotiated between the national state and the Piedmont region in the field of research, innovation and university**



Source: Finpiemonte Background Report (2007).

The ongoing Italian budgetary squeeze has hindered both devolution and regional innovation policy leaving few strategic resources available for capacity-building

A recent OECD country review highlighted that the central issue in the field of Italian economic development was its falling rates of knowledge capital accumulation, and the diminishing levels of productivity growth attributable to Total Factor Productivity (intangible capital). In the period 1992-2006, TFP productivity growth has been negative for the private sector and for business services, a worrying trend. The national state's response to this has been to deregulate national markets, to increase competition as a stimulus for greater investment in and exploitation of knowledge capital investment.

This deregulation process has overshadowed all other economic policies, particularly given the strong budgetary squeeze that Italy has faced since the early 1990s. This has arisen from efforts firstly to meet the Maastricht single currency criteria, and more latterly the public budgetary elements of the Growth and Stability pact. This is driven by the National Reform Plan which seeks to reshape Italy's basic governmental structures and approach to regulation to create a national administrative culture more conducive to and supportive of innovation.

A key issue lies in translating the intentions expressed in strategic documents and partnership accords into real action. The financial resources necessary are not always available to allow all levels of government to fulfil all of their competencies and responsibilities. Central to this is ensuring that there are suitable resources available to ensure that the partnerships and programmes promised through a Research Plan are, in reality, properly supported. One blockage within this process, in the Italian context, has arisen due to a failure of the Italian government to fully fund the devolution settlement which granted both financial resources as well as constitutional responsibility for innovation policy to the regions, imposing a time delay and putting a stop to some activities altogether.

This is a particular problem in the development of regional innovation policy, where there is no simple solution of passing downwards oversight and decision-making policy. Effective regional innovation policy involves more than applying national policies at the regional level, but identifying regional needs, developing appropriate strategies and coalitions to realise those strategies *i.e.* capacity building. This activity takes time and requires clear benefits for participants to encourage co-operation in developing and

implementing regional strategies. There is a risk that a failure to deliver regional innovation strategies because of this shortfall in resources will create a perception that regional innovation policy has nothing to offer to the Italian regions. This would severely undermine central attempts to reinvigorate and renew the Italian national economy.

Innovation is a central plank of the Italian national Research Plan, but there are very few State resources directly devoted to business innovation

The Italian government has elaborated a national research plan which sets out national level policy objectives and the strategic lines of action. The National Research Plan is a top-level governmental strategy document which complements not only the national reform programme but also the recently approved *Industria 2015* plan. Resources for the National Research Plan are supplied through the national budgetary law. The National Research Plan ran from 2005-07 and had three main strategic lines of action:

- "reinforcement of the scientific base of the country, looking for excellence, merit, internationalisation, economic growth and valorisation of human capital;
- strengthening the technological level of the Italian productive system to maintain competitiveness, focusing on ten strategic industrial research programmes, also involving the participation of universities and research centres;
- supporting active participation in EU programmes and in international agreements."

One of the priorities of the National Research Plan (2005-07), approved in March 2005, is the promotion of 'the capacities of SMEs to innovate processes and products and form clusters at local regional areas. This fits with the competence of the Italian government to promote balanced regional development across the country as a whole.

It appears that there are insufficient national resources allocated to ensure that the regions have the competencies and the knowledge to effectively implement regional innovation policy. This could spoil both present and future attempts to build strong regional innovation cultures. Close attention needs to be paid to whether these financial problems are undermining the development of innovation policy in the Italian regions.

From 1998 to 2001, Italian regions developed opportunistic regional development activities based on a constitutional mandate without dedicated resources

Before 2005, Italian innovation was pursued in an opportunistic and experimental manner. A major part of the changes have therefore been attempting to use the reforms to integrate existing activities into a coherent basis for regional innovation policy. Prior to 2001, innovation was *ad hoc* and without its own budget line, and restricted to what could be promoted through other activities and funds. In the 1990s and early 2000s, spurred on by the European Commission, many Italian regions used EU Structural Funds to directly invest in innovative activities to encourage co-operation between firms, universities and other regional actors. A significant amount of financial support flowed into a very wide range of activities, including a number of pilot innovation and collaborative partnerships between firms, universities and research centres. The increasing accent placed by the European Commission on innovation as a central plank of Structural Funds' interventions had meant that there were a very large number of organisations claiming to be active in the field of innovation.

Given Italy's acknowledged absence of an efficient and streamlined evaluation culture, it was very difficult to distinguish which of those projects were working well, and which were not. This situation was further undermined by the fact that the sheer volume of projects funded was a distraction and a barrier to access for potential users of those projects. The Chambers of Commerce in Piedmont, for example, argued that any firms seeking to expand its horizons and become innovative firms faced such a prolonged and haphazard search for help that the value of the subsidy could not be justified in terms of the time taken to locate the correct supporting institution. There was therefore a strong justification for ensuring that this system was rationalised, so that only the best projects were funded, and that "best" was clearly understood as stimulating innovative interactions in SMEs.

Since 2005, it has been possible for regions to invest directly in innovation activities. This in turn required a strong institutional commitment to shift away from funding existing activities to allocating funding on the basis of explicit goals, strategies, targets and outputs. Alongside this, the Italian budgetary squeeze meant that regions did not have the resources to directly fund sufficient business innovation in their regions to meet the Lisbon target. Regional authorities have therefore turned to see whether they can change their policy focus from directly funding innovation and support activities, to encouraging better co-operation between partners. There has

been a shift in emphasis from funding good innovative ideas towards funding good innovative ideas that require partnership activity to succeed.

The intention behind this change is quite explicit, make funding conditional on innovation projects creating significant resources – knowledge, venture finance, skilled personnel – available to regions' innovative businesses. On the one hand, they are attempting a paradigm shift, from a haphazard, organic support for existing activities towards a more programmatic and systemic approach. On the other hand, they are trying to encourage a system evolution, so that successful pilot partnerships drive a wider regional learning process, that build a culture of innovation across the public, private and third sectors across Italian regional economies.

Regional strategies

Regions have developed innovation strategies but have suffered from a squeeze on the resources supposed to facilitate effective regional innovation policy

There are some similarities which define the Italian approach to regional innovation policy. One example is that most of the regions have created a specific Ministry (*Assessorato*) in charge of R&D and innovation policies, or delegated the legislative power on the subject to existing Ministries holding portfolios such as the economic development or education. In all regions, authorities maintain their exclusive co-ordination role, acting in collaboration with the local development agencies. Only two regions (Lazio and Emilia-Romagna) have chosen to delegate all the planning and managing activities related to R&D to a development agency. Every region except one (Marche) have made clear the goal of increasing their financing towards industrial and pre-competitive research, whilst setting the requirement that such initiatives must be businesses led involving research centres and universities.

In spite of these similarities, Italian regions have exercised their constitutionally enshrined freedoms to define their own objectives and to select different stakeholder groups for participation in activities. Some regions have focused their attention on the support of innovation and research demand, whilst others concentrated efforts on reorganising and strengthening universities and research centres. Many regions have planned to support private technology demand, financing high value-added services that sustain innovation processes in the firms, such as intellectual property

rights and technology audit services. In general, the financing forms and the financing beneficiaries strongly differ from region to region, ranging over initiatives such as platforms, projects and consortia, direct support to researchers and inventors. Whilst most regions have created *ad hoc* Committees or Councils to deliver evaluation and selection around implementing innovation support policies, these bodies differ from region to region in their composition, mission and duration.

The Piedmont is trying to rebuild its innovation system in two ways, increasing co-operation between innovators and extending innovation beyond large manufacturing firms

Since 2005, the Piedmont Region has developed a regional innovation policy, a break from previous practice in three main regards. The first was a desire to make use of the new opportunities opened up by regional devolution in 1998, which granted regions competencies in the fields of science and innovation but which remained at that time unused within Piedmont. The second was the wish to avoid further complicating an already dense innovation ecology in which many businesses complained of not being able to access the institutions supposedly available for assistance. The third was to shift the way that the Regional Government was delivering its policy, from stipulating particular instruments for helping firms, to supporting networks and partnership organisations which generated benefits through collaboration, allowing the Region to perform a more strategic oversight of the RIS.

The centrepiece of the change was a new Regional Law, "A Regional System for Research and Innovation" (R.L. 04/2006). This defined the system as comprising all the public and private actors in a variety of sectors, including public, private and non-profit, which had a permanent established presence in the region. The law's objectives, set out in article 2, including promoting research and innovation, consolidating the research system, and creating a culture of systematic evaluation and performance improvement within the field of innovation policy. It is this law which provides the legal foundation for the reforms that have followed in the last three years.

The rationale behind the reform was that there needed to be a change in the way that the business of innovation was undertaken in Piedmont. The region intended to take the business support tools and networks that already existed, and subject them to a new "strategic regime" which regulated the existing activities around the Regional Government's single vision of a more innovative Piedmont regional economy. This intended to ensure that

activities were still supported, and the activities still supported businesses, but as an additional requirement, those activities also fitted with the principles of the Piedmont RIS.

The legal foundation for the Research Plan has attempted to ensure that public funds invested by a range of agencies in innovation in Piedmont conform to a set of basic principles. The principle of "evaluation" is highly important in ensuring that the institutional reforms to the innovation system are paralleled by a wider learning regional process creating knowledge about the functioning of the RIS. The intention is therefore at the end of the three year Research Plan for regional actors to be sure that they have a well-functioning innovation system in which instruments do not have to compensate for problems created by other instruments.

The Regional Government of Piedmont is therefore attempting to drive through change at a number of different levels of activity. Firstly, it is trying to change the way that innovative organisations behave in Piedmont, and encourage more rationality and less opportunism. Secondly, it is expanding successful experimental activities to increase and leverage resources made available to innovative businesses. Thirdly, it is trying to encourage the creation of new, high-growth, high-potential innovative businesses to change the nature of the Piedmont economy. This is an ambitious – and long-term – programme for change, and reviewing its performance requires appreciating the long-term nature of the expected outcomes.

The Regional Government has been consistent in moving from a vision for the plan through to its practical implementation

A central aim in developing an effective Regional Innovation and Research policy is to ensure that there is a robust policy process. In particular, it is vital to ensure that innovation policy does not become a mechanism for funding projects for which other core funding cannot be found. Avoiding this eventuality is best encouraged by setting the highest standards of transparency and consistency from the outset, and upholding those high standards as the policy programme develops. The way the Regional Law 04/2006 is drafted suggests that there is a good legal foundation of transparency and consistency which should help produce the most effective innovation outcomes for the region.

The starting point for the consistency of approach is the Law itself, which begins by clearly stating the aim, "In the exercise of its concurrent law-making powers on scientific and technological research and the support to innovation in production sectors, as provided for by article 117 of the Constitution, the Piedmont Region organises, promotes and co-ordinates the regional research system within the European Space of research" (Article 1). This consistency of approach is taken in specifying objectives, the regional innovation system, the approach and mechanisms, providing a high degree of clarity about participating stakeholders, and creating a very clear governance arrangement for the Law.

The Piedmont Region has tailored the Law to deal with a particular identified shortcoming in the RIS before 2005, namely a tendency for a lowest-common denominator approach to allocating money between sub regions and the absence of regional-level control. The Law has created a useful governance structure for ensuring that the financial investments deliver effective regional outcomes. The current emphasis is shifting towards sustaining these governance arrangements and ensuring that operational and strategic decisions continue to be taken to maximise regional performance, and are not captured by sub regional or other special interests.

The Regional Government has adopted a stakeholder approach: all activities involve partnerships and networks in developing strategies, drafting guidelines, constructing consortia and selecting projects.

In the last three years, regional policy makers have announced a change in the direction of enterprise policy towards the creation of new high-technology sectors and firms, by drawing on existing technological assets in the region. This is part of a wider cultural shift in the region away from being a branch-plant economy of employees to a dynamic region of entrepreneurs. The objective is to increase access to potential and contemporary regional entrepreneurs to the resources necessary for successful high-technology businesses, by mobilising existing firms, laboratories, research groups and universities to support new businesses. In order to deliver this wider cultural shift, the Regional Law deliberately operates on a broad scale, involving as many groups and representatives as possible, to try to develop and enshrine new ways of working.

The Law established a number of committees to oversee the writing, implementing and evaluation of the plan. The previous Structural Funds (DOCUP 2000-06) committee operated rather more opportunistically than rationally. In particular, in the absence of a clear set of guidelines for what was to be achieved regionally, decisions tended to favour a balanced sub regional distribution of funds over thinking intelligently about building critical mass. This has been replaced with a three tier system, providing a basis for a much more hierarchical organisation to be imposed on the way that innovation policy is implemented. At the top of this system is the lead legislative body, the Regional Government, which provides the resources, the principles and the oversight of the decision-making process. Their interest is enshrined within the law and Research Programme. One level below is a group of committees which develop programmes and instruments to spend the resources, also directly overseen by the regional ministry, as well as the RDA. Next come the individuals and partnerships that make proposals to the Plan committees, which are subject to external monitoring and evaluation by the Programme Committee.

There are three principal committees established through the Law which determine the governance of the Regional Law and the execution of the Research and Innovation strategy. The Regional Committee for Research and Innovation is the direction-setting body for the operation of the law. The Restricted Committee provides the executive body directing the implementation of the Research Plan. This committee is drawn in its entirety from the Regional Committee, but is much more restricted in its membership, ranging in size from eight to 14 members. The Scientific Commission is a reflective body for the Regional Committee, and provides a wider intellectual context for the implementation of the plan in the light of global best practice and knowledge about economic and technological opportunities within Piedmont and beyond. It is staffed by five scholars or researchers of international standing, selected from university teachers, researchers and personalities with high scientific qualifications, along with external experts. The Commission can also call on external experts within the limits established by a resolution of the Regional Executive Council, and the Regional Law has established an external evaluation group which provides *ex ante* and *ex post* expert input for the implementation of the law.

A great deal of effort has been placed into ensuring that there is as much capacity building as possible, at all levels, within Piedmont. It is widely acknowledged that the effort involved in producing an effective innovation strategy can focus the minds of participants on the demands of the strategy rather than the needs of its ultimate recipients. The Region has attempted to ensure that any agency that accesses resources through the Plan has had to seek out local research partners, and that every funded project will benefit

local SMEs. Piedmont has squarely targeted increasing the numbers of innovative and fast growing businesses within its regional economy. Involvement of business representative organisations has been enshrined into the legislation with *Confindustria*, a member of the Regional and Restricted Committees.

The other dimension to capacity building is that there has been a great deal of effort to ensure consensus among the various actors, and to create a group of innovation leaders who have proper understanding and experience in co-operation. The Regional Committee, for example, must include the Chairman of the Regional Executive Council, and representatives from the *Compagnia di San Paolo* (The San Paolo Company); the CRT Foundation; *Confindustria Piemonte* (Piedmont Manufacturer's Association); *Federapi Piemonte* (Piedmont Association for small and medium enterprises); the Artisan Unions; *Unioncamere Piemonte* (Piedmont Union for Commerce, Industry and Agriculture); the Association of the Foundations of the *Casse di Risparmio Piemontesi* (Piedmont Savings Banks). Each regional university can also propose one member for this committee. A further 25 stakeholders most representative of local bodies are co-opted from environmentalist groups, science parks, research organisations, cultural foundations, labour unions, higher education, trade and farming.

Although in the short-term a top-down governance model may allow particular projects to succeed, it will work against the larger challenge of changing the overall culture approach behind Piedmont's innovation policy. This emphasises the need for independent bodies within the RIS to co-ordinate the learning processes from the participating agencies and actors, and to ensure a steady stream of support for new innovation processes. A balance must be struck in providing strong leadership with sustaining initiative amongst regional actors. This requires a robust understanding of where regional capacity lies, and emphasises the need for a strong and independent regional board able to comment on the progress of the Research Plan.

The main research activities – HEIs, public research laboratories and firms are not notably "local" and will not automatically produce regional benefits from their work.

Although the context of innovation is regional by virtue of the location of the firms there will be many extra regional aspects to the solution of the innovation problems. Customers may lie outside the region, as may suppliers of capital. More crucially, the solution to problems may be in universities overseas or lie in collaboration with overseas firms. A vibrant

Piedmont innovation system will be marked by the richness of these connections, and, indeed, one of the powerful functions that university academics can perform is to provide the connections to knowledge that lies outside of Piedmont.

Throughout the strategy process, emphasis has been placed on the importance of international best practice and peer review in calibrating regional innovative activities. International networks are a very useful mechanism for involving external experts in reviewing, analysing, and benchmarking the process taking place in the region. More thought must be given to how existing networks could usefully be leveraged to improve the quality of strategic thinking taking place around the Research Plan process. At the same time, there is a need to ensure there are sufficient "absorptive spaces" that ensure that the benefits of innovative activity become embedded in Piedmont's economy.

Innovation and renewal are central to Piedmont's governing accord: there are more opportunities to join-up activities, notably around healthcare

The locus of Piedmont's reforms have been around creating a strong new centre of power to bring some coherence to a very wide range of innovation activities, networks and partnerships already under way. The programme for government 2005-10 reaffirmed the Region's commitment to hitting the Lisbon Agenda target of 3% GERD in GDP. Since the change of government in Piedmont in 2005, reforms have attempted to address what were perceived as the contemporaneous weaknesses of the Piedmont Regional Innovation System, notably the lack of strong political control over policy decisions, in parallel with a highly fragmented and confusing support system.

The first implementation signalled by this programme for government has been made at the Regional Government level, where a new Regional Ministry (*Assessorato*) was created to oversee all the activity, with a dedicated Regional Minister (Andrea Bairati) overseeing delivery through the ministerial arm of the Regional Government. The new Regional Ministry has the full name of the Regional Ministry for University, Research, Innovation and Internationalisation policies, Telecommunication, E-government, Industry and Energy and is responsible for defining, developing and overseeing strategies and policies of the regional government in these fields. The other main change in the machinery of government within the Regional Government has been a refocusing of the regional development agency Finpiemonte, to create a much closer link

between policy and delivery, and to provide much greater transparency over the progress being made in implementing the regional agenda for improved innovation performance. The Regional Government has also been active in reforming institutions in other policy areas in order to improve their contribution to the innovation agenda.

A central instrument for delivering the aims of this law has been the Three-year Research Plan, which sets out in detail how precisely the objectives of the Law will be met. This Plan highlights the measures that will be made available, where investments will be made and the general principles underlying the three-year expenditure plan. The Research Plan was published by the Ministry for Innovation and approved in January 2007, and identifies five action lines into which funding will be diverted, along with the relative weighting which will be given to each of the areas, to a total overall Regional Government budget of EUR 270 million (2007).[1]

Exerting control and influencing a RIS as well-developed as that of Piedmont is an extremely delicate task, and there are risks both in being too overbearing as well as being too timid. The solution lies in building a strong knowledge base, involving local experts as well as external reviewers and consultants. The evaluation committee must ensure that it is intimately connected with the development of an effective evaluation culture and is building the principles for rational decision-making, independent from partisan influences, in the Piedmont region.

The first round of the Research Plan has been very successful, with visible signs of a change in attitudes to innovation across the region

The Piedmont Research Plan appears to have taken a set of sensible precautions to maximise its chances for success. It is too early to be able to effectively gauge whether the Plan will be successful. Nevertheless there are a number of striking positive indicators of future successful outcomes. The extent to which these are nurtured and consolidated into the future will shape the ultimate impact of the Research Plan.

The first is that a wide mix of instruments has been deployed in the first instance, maximising the chance that successful activities will be identified and funded. Secondly, the Plan has engaged constructively with existing regional innovation experts, involving world class innovative firms as well as best practice business support organisations. Thirdly, there has been an inclusive discussion around what kinds of activities will be supported, to maximise the chance that good activities will be proposed and supported. Fourthly, local innovative businesses have been enrolled through their representative organisations and cluster groups but also directly into

particular innovation activities and partnerships, to ensure that good strategy is translated into effective innovation in SMEs and, ultimately, wealth creation. Finally, there is evidence of good use of internal and external experts.

What is also notable about the first year is that the region's actors have managed to avoid many of the problems and weaknesses that may beset inexperienced regional innovation policy makers. Firstly, there has been a relatively limited amount of institutional overhaul, primarily amongst those institutions directly controlled by the Regional Government, and there has not been an attempt to reshape partnership groups. Secondly, there has not been the import of ill-fitting alien practices and concepts to the region – the Plan is based on a set of analyses and reflections that understand how the region's existing strengths can be magnified into the future. Thirdly, the region has not set an ambitious end-point to be achieved at all costs, but has instead attempted to embark on a process of change, which signals an attitude appreciative of the long-term nature of those attempted changes.

The interest in and enthusiasm for innovation policy does fluctuate, and those regions which have been most successful in building a regional innovative culture through policy interventions are those with strong pro-innovation voices when politicians lose sight of the overall issue. Strong advocates for innovation policy must emerge to sustain the idea when the original strategy reaches the end of its life, the Law is superseded or the political mandate of the initiators expires.

The Regional Government has identified a number of successful projects and aimed to increase their scope, building on success

The focus taken by the Region has primarily addressed the desire to initiate a process of reform and change in regional attitudes to innovation, rather than specifying an end-point around which the system is intended to settle. It is clear that this is a long-term process, so for a range of activities Piedmont has an established track record in encouraging innovative businesses to widen the scope of their activities. In some cases, this has simply meant providing more funding to work with more clients; in other cases, changes have emphasised working with novel client groups, particularly other industrial sectors; there have also been good examples of how institutions have been reconfigured in order to help them evolve to better meet the needs of regional innovators.

One of the sources of the strength of the Piedmont RIS is the existence of a number of successful innovation support activities at the heart of networks. These support organisations have developed over time, and

helped improve the access of their members and sponsors to innovation support resources. By way of illustration, the Standing Consortium for Education and Research (COREP) is a partnership between a range of agencies, including the universities, but also includes representatives from a range of other sectors. COREP is highly focused on delivering three things: innovation, training and services for its members. COREP draws together its partners and subsidies to deliver particular activities such as post-experience masters courses or technology transfer in particular sectors. COREP has a great deal of experience in regulating the interface between firms and businesses, creating projects that constructively support interactive innovation. There have been a number of projects which have successfully outgrown COREP and gone on to occupy their own position in the RIS, including the Polytechnic incubator "I3P" and the innovation accelerator "AI3".

The more general point is that it is possible to develop existing networks into new activities. However, actors with innovation competencies do also have their own institutional interests. Effectively managing these networks and activities requires an understanding of these wider institutional interests. There have to be clear reasons and incentives for networks to change the focus, scope or scale of their activities to benefit potential or latent network members. Networks themselves are not always functional and responsive to policy incentives. Building a strong and effective RIS does involve effective leadership from above (from the Regional Government) or from below (from the main regional networks) to identify common areas of interest and potential areas of collective, communal and co-operative activity. Given that the hallmark of Piedmont is the proliferation of these innovation networks, identifying and exploiting common interests must be a priority for the effective management and improvement of Piedmont's RIS. There is a great degree of duplication, and there is an implicit hierarchy in decision making that is not always reflected in the formal governance arrangements. However, it is important to emphasise that this arrangement works, although its efficiency and transparency can be questioned.

A reliance on visible projects raises the risk that innovation policy ends up funding activities that would have taken place anyway, and therefore becomes a means for special interest pleading. A further risk with these large and complex strategic projects is that they can become bogged down and acquire a political significance that can distort evidence-based policy making, undermining the establishment of a regional evaluation culture. There is a need for close monitoring to ensure that these risks are being mitigated at every stage.

There are uncertainties over later rounds of the Research Plan and its medium term future

The Regional Research Plan launched in 2006 uses a common vision and focus to help forge links between the actors. The emphasis has been on re-ordering regional innovation actors to build collective action and shared critical mass. The Regional Government has noted that there is a plurality of innovation promotion activities but it has proven impossible to manage those activities. The underlying intention has been to stimulate bottom-up innovation but then channel that innovation – through compulsory co-operation – towards shared goals that in turn together provide a common regional direction. The next logical stage of development of the RIS would involve improving the RIS governance, distinguishing more clearly between the various' actors roles and responsibilities.

This could potentially mean that the Regional Government would no longer be involved in the daily oversight and management of the intermediary organisations, mandating an independent organisation to deliver those goals for a five year period, and holding that body to account through a supervisory rather than micro-management role. There is also a need for an organisation which proposes and supports the annual plans within the strategy on the basis of ongoing reflection and evaluation. Finally, a body needs to work to ensure that the various activities (science parks and strategic sites) are effectively integrated into a set of "strategic projects" that interact effectively as a regional competence network.

There are a range of governance configurations which could deliver this hierarchy of responsibility. What is more important is that there is an explicit acceptance of the current implicit governance arrangements, and the roles of the various actors are clearly defined. Currently, Enzima-P is designated as the regional innovation platform, Finpiemonte fulfils some of the roles of the Regional Innovation Agency, Rethink acts as an *ad hoc* regional innovation agency, Enzima-P also co-ordinates regional technology transfer models, and more recently, proposals have been advanced for 12 thematic innovation clusters. These are all organisations with considerable knowledge about effective partnership and business innovation, and the next step is to clarify governance arrangements without wasting the knowledge held by various regional partners.

A critical issue in this respect is the real possibility of maintaining the same shared vision into the next plan period. Developing an effective innovation policy is now a shared challenge for many OECD regions; even those with a long history of active regional innovation policies have found it difficult to ensure cost-effective outcomes. In Germany, several states

recently reformed their innovation strategy. For instance, North-Rhine Westphalia reformulated its innovation strategy in August 2006. The problem for NRW was that, at least in the past 20 years, innovation and technology policy was directed at too many activities, with the effect that, after a few years, budgetary constraints resulted in a lack of available funds and therefore no sustainable structures could be established.

Piedmont highlights the importance of collective forums as the places where critical and reflective regional evaluation cultures are created by taking hard decisions in real-life situations. Piedmont has found initiating action more important than undertaking region-wide discussions. However, there are signs that tensions are building that more consensual and discursive bodies can address. The next step in Piedmont's evolution is to ensure that open discussion forms the basis for the medium term evolution of the policy to 2011.

There is an emphasis on "softer" evaluation over harder institutional removal

The Research Law recognised from the outset that its success was dependent on reconfiguring a system which was in turn dependent on persuading a number of existing innovators and support agencies to collaborate more effectively. The Region deliberately eschewed an institutional reorganisation, and has worked through allocating funding through competitive, transparent calls for projects which have provided resources to those activities best aligned to the interests of the Research Plan. The missing element within this has been a mechanism to identify and eliminate those activities not effectively contributing to improving regional innovation in Piedmont. It is not possible to identify in the course of a short review which institutions might be underperforming, but it is notable in the text of the Law, as well as following more recent developments, that there is an absence of mechanisms for tougher evaluation, and critically, for the removal of non-contributing institutions.

There is a discrepancy at the heart of the Regional Law between the desire of policy makers to reduce the number of institutions and improve signposting in a highly complex RIS, alongside the creation of a range of new institutional forms, including the Technological Platforms and innovative clusters. Unfettered institutional growth in the period 2007-09 would clearly be an undesirable outcome, and in the last decade there has been little tendency for innovation partnerships institutions to terminate their own existence. There is a need for more thought to be given to develop appropriate tools for institutional removal, in particular upholding the

principles of transparency and consistency which are necessary to ensure a broader institutional change.

A robust methodology for institutional removal is currently lacking from Piedmont, in part intending to avoid inflaming regional tensions and undermining attempts to engender a positive regional innovation culture. The new institutional arrangements – including widespread stakeholder participation and consultation – would be at threat from the rise of vested interests within the RIS at odds with those promoted by the Regional Government. A key challenge for the Regional Government is in making the case for institution removal in the abstract, and persuading regional partners of the need for further institutional simplification.

There is no clear public face to the Research Plan in terms of high profile and eye-catching activities

The entire science and innovation policy in Piedmont is focusing on attempting to build an effective regional innovation culture there. Although historically the region has been home to many innovative businesses, evidence suggests that people do not associate their own occupations with innovation. There have been attempts to address this through the use of festivals and promotional activities, such as the World Design Capital (*qv*). This aims to address the pessimism which has emerged in some of the manufacturing branches that their outlook is not so bright, and encourage people to invest more in innovation activities.

The Research Plan in this round has been highly technology-focused, a consequence of the fact that the Polytechnic has been a leading light behind its emergence. Generally, there is a desire amongst regional actors for change in this area. There is a general problem in the region that there is not much direct investment in regional human capital. There was no regional design school which might have provided a human dimension to high-technology innovation. The strategy of focusing resources on a limited number of fields, initially biotechnology and aerospace, has allowed greater focus and priority, but the drawback is that public visibility is low for these sectors. Also, no good mechanism exists within the partnership for proposing and identifying flagship innovation projects where Humanities and Social Sciences meet the physical and medical sciences.

There is an issue concerning the policy scope of the Research Plan. The Regional Plan has been very effective in drawing together actors in industrial, research and innovation policy fields, and helping to build a

shared community of practice around knowledge exploitation. There are other fields which could potentially become involved, which would also help to improve the public perception of the utility of the Regional Plan. One notable policy domain as yet relatively unconcerned by the Law is education, both within universities, but also at pre-university level. One area worthy of further consideration is how future activities could have a more general impact on education, in the context of Piedmont's comparatively low educational levels in a European context.

A further area where more could be done to improve the visibility of innovation – and its salience for societal improvement – for the citizens of Piedmont is in the field of human health care. There is some work around converging technologies in health sciences, so matching humanities and the social sciences through the health area, in fields like neuroscience. There are also research centres around landscape & urban planning, economics and genetics/genomics which have the potential to make greater social impacts. What is clear is that much greater pressure from a range of regional and national ministries will be necessary to encourage these research organisations to take a much closer interest in the translation of their research and infrastructure investments into visible public innovation outcomes.

There is a plan to launch a creativity platform managed by a spin-off company emerging from the Torino World Design Centre project. One of the "innovation clusters" (*qv*) also funds firms to use industrial design consultancies in mature sectors, such as textiles, to actively encourage young designers to work with SMEs, thereby diffusing the values of TWDC. Two areas where future progress could be made, in terms of eye-catching projects which will mobilise social partners, are in the field of sustainable/renewable energies, as well as the creative platform. The creative platform has created a new fund for investment in cinema production, which aims to support a new generation of media production in the region.

There are elements of a developing cultural sector being supported by the innovation strategy, including certain activities promoted under the World Design Capital umbrella in 2008. There are plans to ensure that the momentum generated by the Torino World Design Capital is sustained, through creating a spin-out company. This may be sufficient to help current and potential investors reappraise their understanding of the Piedmont region and lead to its successful emergence and recognition as one of the leading technology manufacturing regions.

For a Plan so heavily dependent on new high-technology firms, its emphasis on entrepreneurship promotion is remarkably weak

Recent innovation thinking highlights the importance of the interaction between researchers, government and businesses for driving forward constructive innovation capacity building. The idea of the "triple helix" has been suggested as a metaphor for how this can be improved – governments can improve co-operation between universities and firms, and in so doing, alter the "DNA" – the habitual behaviour and inclination of each sector. If this is done effectively, this can help to deliver core government policy aims – and the "holy grail" for "triple helix" policies lies in creating effective entrepreneurial triple helixes. In these situations businesses and research organisations work together creatively to bring new ideas into the market.

This raises the question of whether it is possible through a systemic research and innovation policy, as has been followed in Piedmont, to invest in high-quality research activities, while simultaneously encouraging those researchers to behave in new ways. Clearly, the long-term success of the Research and Innovation Plan will lie in whether or not it can encourage the successful valorisation – within regional businesses – of knowledge held in public and private research organisations. The challenge is whether Piedmont possesses the entrepreneurial and business skills necessary to promote this valorisation. In short, the question is whether the Research and Innovation Plan is helping to build a more effective and entrepreneurial triple helix in Piedmont.

The Torino Wireless Foundation was conceived by Professor Rodolfo Zich, former vice-chancellor of the *Politecnico di Torino* (Turin Polytechnic) and president of the *Istituto Superiore Mario Boella* (ISMB). The TW Foundation was created between 2001 and 2003, by public (State, regional, provincial) and private (ISMB, Bank San Paolo) entities. Since its inception, TWF has focused on three main tasks which seek to encourage entrepreneurship:

- **Enterprise acceleration**: a particular problem for the sector is encouraging the best and brightest graduates either to start their own businesses, or to work with new business to stimulate innovation.
- **Networking**: creating an institutional space where companies could work together, share and exploit knowledge, and collaborate on joint projects.

- **Venture Capital**: Investors were needed to support and accelerate business growth.

TWF is one of a limited number of flagship national technology districts and its activities therefore benefit from national imprimatur. This may grant them the necessary long-term stability and sustainability to have a chance of making a real difference to Piedmont's underperformance in terms of new firm formation in high-technology sectors. It has been an unqualified success: if other districts were to be identified within the region, they ought to follow the example of TW with a counterpart of their own. The Torino Wireless Foundation certainly benefits from its participation in the national programme, which provides some of the key resources for delivering the innovation outcomes.

There is the potential for TWF to become a central node in a more general innovation promotion network extending into the various sectors present in the region in which innovation and entrepreneurship underperformance is the norm. In Piedmont, strengthening the business cluster policy could encourage SMEs to exactly the levels of innovation that the Region is trying to develop. TW's evolution in ICT should serve as an example for other sectors. In such a case, the role of new organisations such as ENZIMA-P could be to identify and help establish new industries, linked, for example, to the application of technologies developed in the Technology parks.

Access to business support is still very opaque when viewed through the eyes of SMEs searching for help innovating

Piedmont has a very rich and very dense set of regional innovation actors – its main innovative problem is not, therefore, a sparse environment for innovation. Rather, there appear to be problems in the various innovation organisations working together – it is a fractured metropolitan innovation system. The compelling rationale for the introduction of the law was a rationalisation of innovation support for businesses in Piedmont. The goal was to eliminate the dependence of outcome from the business support system from the point at which the system was approached. The idea has been to create a system in which regardless of whether a firm approaches a university, the Chamber of Commerce, or a science park, they will ultimately receive the best assistance to which they are entitled. This is a long-term goal and the DIADI project established by COREP as well as the

European Relay Centre of *Unioncamere* were both previous attempts to address the apparent confusion within the innovation system.

This signposting and referring between activities is one element that does not appear to have been addressed adequately in the regional innovation strategy. There is no one body or Regional Innovation Agency which helps businesses to access the services available. What is not clear, in the current arrangements in Piedmont, is how advice is provided to firms who are not able to articulate it in terms of a clear research proposal with an established university partner. Is the intention that Enzima-P play this role, and who will provide the direct mentoring and advice to businesses? What will be the relationships with *Unioncamere* and the support services that they provide for their membership? How will business advisors working with firms build up relationships with business development managers in the regional knowledge institutions?

The ultimate value of the Plan will be whether it increases the number of smaller firms innovating. The best advocates and champions for regional innovation policy are businesses which have demonstrably benefited from novel approaches and methodologies to business innovation. The various technological platforms require the opportunity to exercise this public representative function and help provide greater business representation into debates around the future evolution of Piedmont's innovation policy. The risk is that such organisations become narrowly focused lobbying groups rather than supporting a demand for continued innovation activity.

Piedmont has taken a bold experiment in regional innovation, embodying a spirit of co-operation with the potential to sustain the region in completing its economic transformation

The first two annual rounds of the Research Plan 2007-09 in Piedmont are now underway, and both have been marked by a mix of ambitious and experimental activities seeking to consolidate existing strengths. The Research Plan now finds itself at a crossroads, facing the choice between seeking out further experimental activities or consolidating the activities already underway. The former risks refragmenting the RIS and undoing the hard-work already undertaken to improve system coherence; conversely, the latter risks becoming stale, and tarring the idea of "innovation" as an old-fashioned policy approach, dispersing the enthusiasm and momentum built up in the last three years. There is a need to find a balance between these

two paths, and the two risks, to ensure that the Law is concluded as successfully, and as inspirationally, as possible.

One area where the Region could both inspire and succeed in the field of innovation is improving the public recognition and understanding of the importance of innovation to their lives. As well as festival activities, more investment in sectors with a more human dimension to their technological innovation is necessary, such as in the fields of health care and the quality of human life. The region has strong technological infrastructure in these fields, and connecting more closely with intermediaries in the health care sectors (especially the more "caring" elements) can enable the third round of the Research Plan to move forward by focusing more explicitly on this human dimension.

Notes

1 The inclusion of ERDF into the Regional Research Plan budget means that in practice the total package for the Regional Law will amount to about EUR 350 million (2008).

Chapter 1

The Systems Approach to Regional Innovation Policy

There is an increasing recognition that there is some role for spatial innovation policy to address market failures which can arise in markets for technology and innovation. At the regional level, correcting those failures involves light touch policies which creates a more supportive environment for co-operation between firms and research organisations. Research is increasingly highlighting that this light-touch intervention is a complicated, difficult process. What policies in particular places can achieve is conditioned by existing successful innovation activities.

This chapter sets out a framework to explore the demands this places on effective sub national innovation policy:

- Firstly, recognising the value of a regional innovation systems approach to developing effective instruments to improve regional innovation environments.
- Secondly, taking a more dynamic view of the innovation process as being shaped by past capacity, current efforts and future intentions.
- Thirdly, outlining a region whose recent experiences are valuable in understanding how regional innovation policy can take these capacity questions into account.

There is a growing realisation that innovation lies at the heart of economic policy

OECD countries agree that innovation performance is a crucial determinant of competitiveness and national progress. Recent discussions at the ministerial level concluded that investment in knowledge and intellectual assets is key to value creation. Globalisation and rapid advances in new technologies, notably information and communications technology (ICT) have spurred competition and opened new markets for the creation and

delivery of innovative products and services. Globalisation has also increased the pressure on OECD countries to move up the value chain and engage in a continuous process of adjustment and innovation. By strengthening innovation, countries, regions, cities and firms can become more competitive, and better prepared to face the challenges of globalisation.

Increasing global competition encourages innovation, and innovation in turn helps to drive competition – a virtuous cycle that leads to more efficient use of human and physical resources. The process, however, poses challenges for firms and for public policy that supports the activities of firms. Firstly, innovation involves a high degree of uncertainty, though with potentially high returns. Secondly, innovation improves the competitive position of firms that innovate successfully, but those that do not, lose out. Promoting innovation is therefore about encouraging change and adaptation, which can also mean accelerated processes of creative destruction in a world economy that is already characterised by unsettling volatility.

Box 1.1. **OECD definition of innovation**

As defined in the OECD *Frascati Manual*: "basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts **without any particular application in view**" (emphasis added). Innovation is distinctive because of its economic and commercial imperatives. The OECD *Oslo Manual* identifies four types of innovation:

- *Product innovations* involve significant changes in the capabilities of goods or services. Both entirely new goods and services and significant improvements to existing products are included.
- *Process innovations* represent significant changes in production and delivery methods.
- *Organisational innovations* refer to the implementation of new organisational methods. These can be changes in business practices, in workplace organisation or in the firm's external relations.
- *Marketing innovations* involve the implementation of new marketing methods. These can include changes in product design and packaging, in product promotion and placement, and in methods for pricing goods and services.

Source : OECD (2002), *Frascati Manual: Proposed Standard Practice for Surveys on Research and Experimental Development*, OECD Publishing, Paris; OECD and the European Commission (2005), *Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data*, 3rd Edition, OECD Publishing, Paris.

Governments are increasingly concerned with regulating the flows and accumulation of knowledge capital

With innovation high on the policy agenda, decision makers are interested in the main factors that propel innovation and the levers that are available to public policy. In general, most countries emphasise that innovation is a market-driven process and that firms themselves will be encouraged to innovate as long as the fruits of that innovation process are captured by the firm that makes the investment. This means that for the most part, governments emphasise the enabling environment for innovation. This enabling environment includes regulatory frameworks, which should protect the intellectual property that flows from investment in research and development (R&D) or other investments in innovation. The competition regime should allow free access to markets thereby avoiding monopoly positions that tend to inhibit investment in innovation by other firms.

The level of innovation in a country is also influenced by the generation and diffusion of new technology and knowledge. Factors that influence this include the investment in basic and applied R&D, the technology transfer effort made by the government and the success of the education system in producing science and engineering graduates. The absorptive capacity of firms is also crucial for innovative ideas to be translated into productivity gains by firms that are not themselves technology generators. Absorptive capacity, in turn, is closely linked to the level of technical and general education in the workforce, as well as cultural traits relating to entrepreneurship and inter-firm collaboration.

Technology and innovation are not usually created in isolated organisations but, rather, where competent organisations and skilled individuals interact in a constructive and complementary way. Innovation depends on the scientific capacity of actors and institutions (their acquisition of existing knowledge and concepts, their openness to new knowledge and their ability to assimilate this information). But the technological and entrepreneurial capacity of actors (their capacity to perceive the usefulness and applicability of knowledge) is also important. Industrial capacity also plays a role (the capacity of actors to transform concepts and ideas into useful, commercially viable products). The focus of policy makers on the concept of innovation "systems" is an example of how the issue of spill-overs and inter-linkages is now central to understanding how innovation is generated. The application of concepts of social capital to innovation is another example.

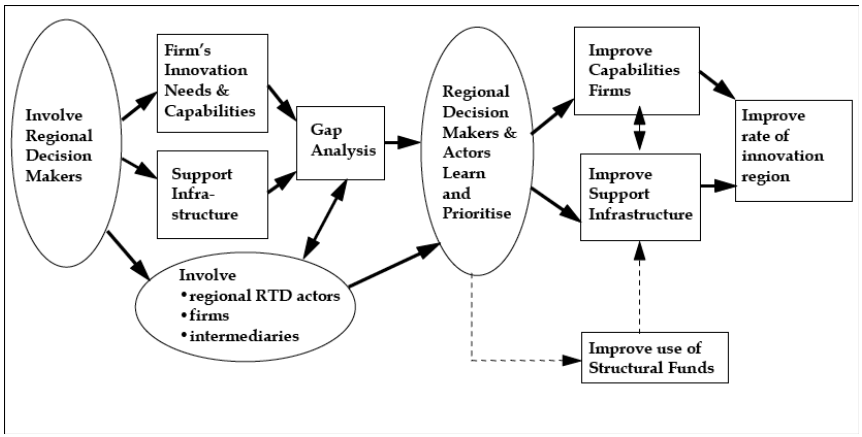
Developing a regional innovation strategy is a process, not an event, and mobilisation, prioritisation and consolidation matter

It is not always possible to anticipate the problems which particular regions will encounter in implementing innovation instruments at the outset. The problems will often emerge or become apparent in the course of trying to develop and implement a strategy. A successful ecosystems approach to regional innovation policy is therefore as much concerned with the effective regulation and encouragement of system-building as it is with developing an effective strategy. The test at every stage of this process is how effectively are particular instruments and activities contributing to encouraging innovation by businesses and clusters of innovating firms.

The kinds of problems which emerge in implementing innovation policy will become evident at different stages in the progress along the innovation policy pathway. In some regions dominated by traditional industries, for example, regional firms and government may be unwilling to even begin thinking about an innovation strategy, the earliest stage of the process. In Thessaloniki, for example, it took the direct intervention of the European Commission to force its government to convene a stakeholder group to consult on a potential innovation strategy. Conversely, in the English regions it has sometimes been difficult to implement innovation strategies, because by the time the strategies are completed, policy shifts demand new strategies (the end of the process).

The European Commission has contributed extensively to understanding this process where regional partnerships come together to develop innovation strategies which ultimately improve the environment for business innovation. The Commission has promulgated best practice guidelines which regard the development of a regional innovation strategy (RIS) as improving both the capabilities of firms for innovation, as well the capability of regional actors to respond to the barriers that are encountered in improving the innovation system. Developing both firms and public sector capabilities requires a shared learning process between actors in which partners work together to collectively take decisions which both shape the RIS as well as provide experience in RIS decision making. This embodies an implicit recognition of the evolutionary nature by which RISs develop.

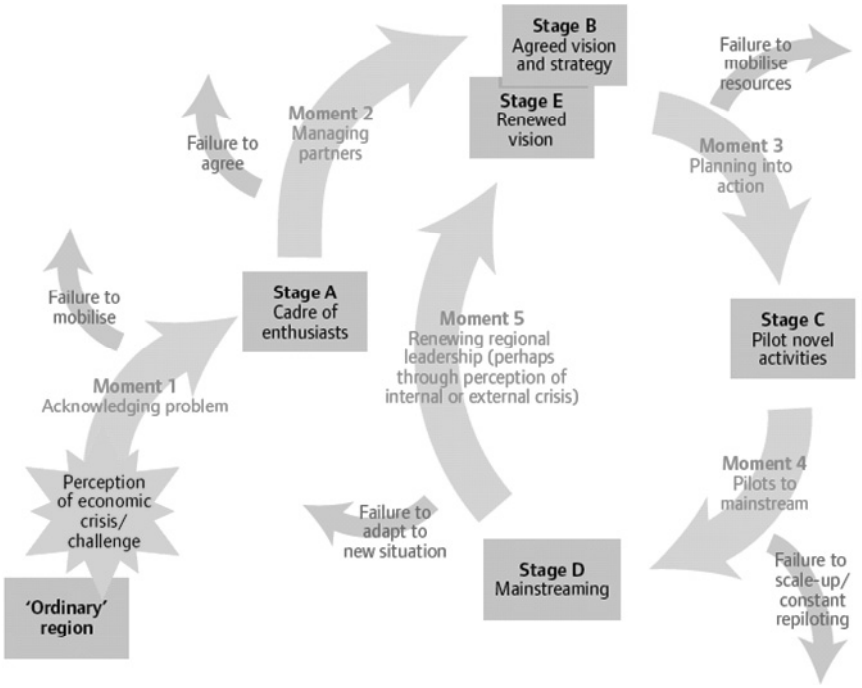
Figure 1.1. **The role of a strategy process in mobilising a regional innovation coalition**



Source: Boekholt *et al*. (1998), *The Evaluation of the Pre-Pilot Actions under Article 10: Innovative Measures regarding Regional Technology Plans*, Report to the European Commission.

Drawing on Van der Ven *et al.* (1999), Benneworth (2007) draws analogies between this process and the idea of an "Innovation Journey", in which actors learn both how to develop new policies as well as learn about working together (see Figure 1.2). The idea of an innovation journey highlights a number of phases through which innovation policies are implemented in particular places. In seeking to progress through each phase, problems are encountered, and dealing collaboratively with these problems influences the eventual outcomes of those policies in terms of firms' innovation. The model also highlights the fact that the end of one strategy period is a critical moment for regional innovation policy, and influences the capacity carried forward to influence further developments.

Figure 1.2. **The critical moments of the regional innovation journey**



Source: Benneworth, Paul (2007), *Leading Innovation: Building Effective Regional Coalitions for Innovation,* NESTA Research Report, December, 2007.

Empirical research has shown that although each of the four stages has its own difficulties and complexities, it is the transition between the stages which are the most vulnerable points for the regions seeking to develop innovation strategies. At each stage, the interaction between policies, politics and people can mean that failures derail the regional coalition developing the policies and disturb the necessary momentum to deliver effective innovation policy. The transition between these four periods therefore represents the critical moments in the evolutionary "regional innovation journey" by which regional innovation capacity builds up in those regions. Each of these "critical moments" has its own dynamics and barriers:

- **Acknowledging the problem**: the regional innovation journey represents a search for agreement on a new regional development model. There will inevitably be a range of people committed to the former development model, and who are unwilling to acknowledge that

it no longer serves the region's best interests. In some cases, a deep seated crisis (such as the collapse of Bilbao's or Malmö's shipbuilding industries) can create favourable conditions for regional partners to acknowledge the need for a new model. In regions undergoing a more gradual decline, urgency for change can be lacking, and such places can develop a defensiveness to external ideas. This can hinder building a broad coalition of key decision makers able to propose and implement a mobilisation.

- **Conflict between community partners**: the first step in the journey can lead to great enthusiasm that change will be produced, whilst in reality becoming an innovative region is a slow process. When external partners are involved in supporting this development – such as with the Commission regional innovation policies – frustration can build that little happens immediately following the great effort involved in the mobilisation necessary to win funding support for an "innovation project". Resources potentially committed to new innovation activities can be "clawed back" at this time or diverted elsewhere, and the effort and common goals can fail to be translated into the necessary trust to lubricate the next phase, building a set of common partnership goals.

- **From planning to action**: the second step in the journey comes once partners have agreed to develop a plan of collective action. Although there can be problems in the strategy development process, what is more critical for producing effective regional innovation is ensuring that what is decided upon in the strategies is acted upon. The empirical evidence is that a few well-planned pilot projects are necessary to stimulate and encourage further regional action. The risk with proposing these projects is that these pilots are seen as the innovation policy rather than as demonstrators to create enthusiasm for a more mainstream regional innovation policy.

- **Sustaining the momentum**: the final critical moment in the regional innovation journey comes at the end of the "innovation project" cycle. Typically, this would involve developing an effective innovation strategy, a number of pilot actions being implemented, and then the project being evaluated. There are strong incentives to remain with a "project" mindset and move to the next project approach, rather than to make innovation promotion central to what policy makers are doing**,** and the gap analysis based public-private approach a standard modus operandi for effective policy which promotes innovation across a range of domains.

Table 1.1 summarises some of the main barriers typically encountered by regions progressing through their own Regional Innovation Journey, and some of the potential solutions to those problems.

Table 1.1. **The key barriers on the journey to mainstreaming regional innovation policy**

Learning	Barriers to progress	Potential solutions
Mobilising a core partnership	Over-reliance on key individuals to motivate networks/ partners. Regarding external experts as having a solution, not helping to generate a local solution. External experts' advice rejected/ ignored by regional partners.	Having core "animator group" of regional authority, innovation support organisation and consultants. Involving regional experts with consultants to ensure validation of external studies and best practise activities.
Conflict between community partners	Failure to think about use of research, spending too long gathering information. A long empty phase where only research is happening and partners drift off. Key actors & staff move on, "deputisation", momentum loss. Risk of public-sector dominance of debates and consensus, with non demand-side logic.	Effective articulation of the questions which the research is seeking to answer. Parallel activities with network activities contributing to the knowledge gathering exercise. Creation of core knowledge base within partnership through negotiated interactions. Use of effective private sector partners with profile and time.
From planning to action	Failure to terminate the plan development process, with continual updating. Re-ordering priorities to fit with politicians' pet plans. Failure to secure private sector investment in pilot actions. Public sector re-organisation rather than delivering pilot actions.	Assessing the plan against the original objectives to show the plan is sufficient (not "best"). Strong private sector involvement in project creation through investing own funds. Encouraging institutional responses that are not organisational reorganisations.
Sustaining the momentum	Steering group activities dominated by running pilot actions not strategic thinking. Innovation policy becomes a covert pathway for bad projects. Lack of certainty about final steps, methodologies, experts, advice sources and exemplars.	Developing a strategic planning cycle for regional innovation. Streamlining and integrating innovation project selection within mainstream processes. Networking with other level IV regions and Commission to develop these tools.

Source: Benneworth *et al*. (2007).

Different innovation actors exhibit differing behaviours and fulfil different systems roles

A Regional Ecosystems Approach to innovation largely differs from a RIS approach in its emphasis on the roles played by the various actors involved in assisting a region to proceed along its regional innovation pathway. Not all actors within a system are equal, in terms of their financial

resources, their power and their legitimacy. Different actors may also play different roles in ensuring progress as well as dealing with the problems that arise in delivering the changes to the regional innovation system. A useful distinction can be made between those that create the networks and connections necessary for innovation activities to be delivered, and those who actually undertake the hard work of ensuring those activities contribute to improved business competitiveness. Van der Ven *et al.* classify the leadership roles exercised in complex firm-based innovation projects into four types, which have different value at different stages in the innovation process (see Table 1.2).

Table 1.2. **Exercise of leadership in the innovation journey**

Leadership role	Influence phases	Type of leadership	"Who is led"
Entrepreneur (typically R&D manager or director)	Continual	Coalition building, Articulating vision, Assembling resources, Producing outcomes.	Problem solvers within organisation, Key resource holders necessary to realise vision.
Mentor/ sponsor (typically R&D director in client business, Politician with strong "base")	Continual and rising	Building support network, Creating wider resource commitment, Building the vision into corporate plans.	Key decision-makers in the domain, Potential allies and supporters of the innovation.
Institutional leader (typically Senior director in innovating business)	Start and end of process	Protecting entrepreneur within organisation, Making others accepting of changes, Promoting vision/ entrepreneur within wider network.	Own organisation, Key stakeholders of own organisation, Key contacts of own organisation, Standards bodies.
Critic (typically Director of innovating company, Potential clients)	Start of process	Knowing when to abandon criticism, Using "repentance" to persuade others.	Opponents of the project, Own organisation respond to changes.

Source: after Van der Ven *et al*. (1999).

As well as possessing individuals that perform these roles effectively, the other dimension which influences how regions develop innovation capacity is the regional style of innovation policy. This is how the individuals fulfilling these different roles interrelate, and their willingness to exercise discretion and autonomy. Some regions have very hierarchical styles of innovation policy, in which senior figures seek to tightly control the activities of those under their control. In other more permissive environments, there is a general willingness to allow many activities to be undertaken independently, and then use the most demonstrably successful of those to encourage others to improve their own practice and behaviour.

This style of innovation influences how regions address the problems that they face in seeking to implement particular innovation policies, and which solutions will work in particular contexts. Those regions with more authoritarian innovation policy styles can be good in concentrating resources and effort on particular themes, sectors or activities, whilst being less good at appreciating the full range of innovation competencies in their regions. Conversely, regions with more permissive innovation policy styles can be weak in eliminating outdated institutions and policies, but much stronger in ensuring that innovation policies have more general salience.

A consideration in developing an innovation policy that anticipates how particular instruments will augment innovation capacity is this regional innovation policy style. If a strategy is developed that introduces instruments that require a great degree of flexibility in their implementation, such as creating innovation networks, this will be more successful the more permissive the innovation environment. It might make more sense for a region with an authoritarian style of regional innovation policy, in such a case, to seek an alternative set of instruments and strategy.

Innovation policies develop over time and future cycles are dependent on what has already been achieved.

The decisions that are taken at the end of an innovation policy cycle are important determinants on the regional innovation policy capacity. A particular strategy will be completed, there will be a view on what is seen to have worked or not, and the political environment may have changed since the original strategy was compiled. The subsidy environment for innovation policy may also have evolved at the same time that a wide array of regional actors has had some experience of what it means to develop a regional innovation policy.

The ideal situation is one where there is a dispassionate reappraisal of the position of the region, its capacities and needs in the light of what has been delivered by the strategy. The decision on subsequent activity is then made contingent on that dispassionate evaluation. In reality, the many other factors outlined above can also come into play to shape what is politically feasible or desirable. Under such circumstances, the policy challenge is to ensure that the subsequent strategy phase exploits as much of the embodied learning of the previous round whilst avoiding any potential problems or pitfalls.

The responses at the end of particular innovation policy phases can be divided into four, excepting abandonment (which is decreasingly likely because of the rising importance of innovation to regional development policies more generally). One response is continuation and stability, through a process of organic evolution; a second response is a rebalancing in favour of actors who were omitted in the first phase (such as particular sectors, or businesses more generally). Thirdly, there may be an attempt to upscale activity, by increasing the scope of activity, either involving more policy areas in innovation policy, or substantially increasing the importance of (and funding for) innovation policy. Fourthly, there may be a rationalisation or retrenchment and a cutting back to focus on activities which have been successful, or hitherto overlooked.

The decision about the direction of future strategy rounds will often be a primarily political one, influenced as much by apparent perceptions of policy success as technical evaluation. Nevertheless, there are examples of good practice in maximising the benefits and minimising the problems which regions face in reconfiguring their strategic direction. Generally speaking, expansion works best when a new institutional framework is created to ensure the novel resources create genuinely novel outcomes. Continuity does require refreshing the leaders and supporters of innovation policies and ensuring that advocates retain their enthusiasm. Rebalancing works best when focused on including new actors rather than excluding those that are seen to have previously unfairly benefits. Consolidating is perhaps unsurprisingly most effective when driven by a conceptual rather than a financial or personal motive.

Table 1.3. **The potential junctions between different regional innovation policy cycles**

Progression	Key elements of junction	Common features	Examples
Renewal	Moving to the next strategic round using the same mechanisms, processes and institutions from the end of the last round.	Using current successful approaches as the basis for new activities. Revitalising the existing partnership by appointing new members & encouraging churn.	The most common situation, encouraged in EU by RIS+ and current structural fund arrangements.
Expansion	Seeking to undertake a new innovation strategy/ policy process which increases the scope & impact of efforts.	Extending regional innovation networks via: Unifying (helping existing actors to better work together). Widening (involving new types of partner in innovation networks). Deepening (encouraging existing partnerships into new activities).	Tampere – developing a strategy based on all actors' knowledge (unifying). Thessaloniki – expanding the ICT innovation pole to three "regional innovation poles" (widening). Twente – creating a regional innovation platform to bring concentration to loose interest networks (deepening).
Consolidation	Learning from the previous strategy round and taking one or more element forward whilst discontinuing other less successful elements.	Drawing a line under a "failure" whilst not undermining successes. Strategically removing unsuccessful activities & actors to allow more consistent progress.	Denmark – moving from national generic clusters to key sectoral networks. Yorkshire & the Humber – dismantling the regional technology network to address its capture by a particular group of manufacturing interests.

Multi-level governance does not only mean that the region reacts to national drivers

It is also important to acknowledge that although the locus of regional innovation policy is primarily regional, there are a wide range of external decisions and actors which influence what can and is delivered regionally. The reality of regional innovation is that it is nested within multi-level governance of innovations, local, regional, national and international actors coming together in networks to make decisions that shape and evolve innovation systems. As with all multi-actor systems, power is not evenly distributed between those actors, and it is often the more powerful actors that play a larger role in determining that progress. It often follows that national and multi-national actors are more powerful in these networks. There has been a tendency to assume, therefore, that this is somehow a "natural" feature of multi-level innovation, policy, which simplifies what are often more complex inter-relations (Sotarauta & Kautonen, 2007).

In part, this reflects the Scandinavian heritage of the "national innovation system" concept in which the "regional" level is traditionally very weak, and the national government does have a strong role to play in

science policy. This is clearly not the case in federal constitutional arrangements where the "regional" tier may have significant control over science and innovation policy. In the case of Australia, the states have considerable freedom in this field: Queensland developed its "Smartstate strategy" which, for practical and political reasons, has subsequently informed national thinking about innovation policy (Charles, 2005).

But this is not only in evidence in federal states, but also in more unitary states, where national policy can often be informed by particular sub national successes which are replicated at, or up-scaled to, the national level. Sotarauta and Kautonen (2007) trace the co-evolution of national and local innovation policy in Finland in the post-war era. They argue that the high level of autonomies at the urban level allowed cities to become laboratories for policies which, if successful, were adopted nationally. In Oulu, for example, its early experimentation with the idea of science parks, and their later replication elsewhere in Finland, such as in Tampere, provided a strong rationale for national government to develop science parks policies to fill gaps elsewhere.

Part of this reflects a trend for policy makers to follow successful experiments, often without understanding the place-specific conditions which make particular kinds of interventions work in particular places (Massey *et al.*, 1992; Hassink & Lagendijk, 2001). However, another part of that trend reflects the longer-term institutional learning necessary to make these contextualised policies more applicable elsewhere. This can make the reality of multi-level governance more complicated than either simply top-down or bottom up. Successful ideas co-evolve between the different levels and this process affects the innovation capacity which builds up.

This can be a complex and long-term process. In 1970 in Belgium, the national government launched an inquiry to develop a science park policy for the country, based on the example of Research Triangle Park in North Carolina. The University of Louvaine (KUL) subsequently hired one of the four commission members to establish a science park at Haasrode in Louvaine. The park subsequently became the location for a regional government-funded centre of excellence in micro-electronics, IMEC. This helped to support the science park, and along with a highly successful commercialisation policy, supported by a lucrative gene technology licensing deal, helped to fill Haasrode with spin-off companies. The success of Haasrode informed both national science and industrial policy, and technology/innovation policy in other regions of Belgium (Debackere & De Bont, 2002; Debackaere *et al.,* 2004).

Table 1.4. **Policy shifting processes in multi-level innovation governance arrangements**

Shifts	Process overview	Examples
Top-down	Higher level government applies instruments across territories; regions and localities implement own version of policy measure.	EU Regional Innovation Strategy policy, refined to a set of steps to follow within a region to produce the "optimum" regional innovation strategy. "Regional Foresight" in the UK as a regional dissemination of national foresighting activities.
Bottom-up	Successful local and regional policies are "adopted" by higher-level organisations and implemented, often reinforcing the strength of successful examples elsewhere.	The recognition of Eindhoven and the Philips Natlab complex as the Brainport Netherlands. The Regional Technology Plan programme under Article 10 (ERDF) – seven regions which then became the basis for EU innovation policy.
Lateral (between actors on the same level)	Policy borrowing of successful ideas between institutions at the same level. External bodies designate particular activities as best practice and worthy of replication, and transfer the policy between locations.	The spread of territorial innovative models (TIMs) to regional/ urban development agencies: 1990s: cluster strategies of Scotland, Catalonia, Quebec and Flanders. 2000s: triple helix strategies of Ottowa, Västra Götaland, Rhône-Alpes.
Diagonal (cross-border/ multi-level)	Policy transfer between both national and regional contexts simultaneously.	Denmark's application of Porterian clusters to its national economic development policy (2000). Adopting in West Midlands (UK) of innovation policy scheme based on Dutch national example.
Cyclical (Inverted 'V')	National policy makers support a local success and enable the local success to achieve a greater impact.	Finland's adoption of science parks and business/university enterprise activities on the basis of successes in Oulu, Tampere and Turku.

Source: after Ressico (2006); Benneworth (2007); OECD/ NUTEK (2007); OECD (2008); Sotarauta & Kautonen (2007).

This has important consequences for actors at a range of levels, particularly higher level policy makers, who need to understand their dependence on successful projects at lower levels to help create more supportive policy frameworks for innovation. This has been quite explicit in Europe, where there have been a number of iterations of European innovation policy measures, each of which has involved regional experiments which have then been expanded if successful.[1] Good examples of this were the rise of the Regional Innovation Strategy approach, which built up from a handful of regional technological plan experiments (Morgan, 1997), and cross-border innovation and thematic innovation alliances which emerged from INTERREG.

There are also very important consequences for regions in developing policies which seek to maximise the support they get from national policies. National policy for regional innovation often reflects a country's most successful regional innovation activities. National policy makers and institutions are important to regional success, not only in initiating particular interventions, but also in encouraging their evolution and development in particular localities and regions. The mentors and supporters for regional

innovation journeys are not only located within the region itself, but may also be from elsewhere. These are not only national policy makers, but may include international organisations such as the European Union (EU) and, increasingly, the OECD, but also sectoral organisations and standing conferences such as Creative Clusters or the Triple Helix conference.

Piedmont has attempted to increase systematic innovation policy

Although there is an increasing recognition that there is a need for an evolutionary nuance to systemic understandings of regional innovation, there is much more uncertainty over what the implications are for policy makers. Can policies exploit "people" and their capacities at the start of a process, or are their contributions something which emerge and are recognised later? If policies can help create capacity and encourage effective leadership in innovation, then what kinds of policies do this effectively? What are the implications of this for the frameworks within which innovation policy is developed?

The only way to address these questions is with reference to detailed empirical studies of regions seeking to use innovation to change their own economic development trajectories. This Innovation Review presents one such detailed study to explore how the balance of systemic interaction and system building/system shifting interact with a study of a region which has deliberately set out to transform its regional innovation system through concerted public policy action. The Piedmont region has become a laboratory to explore some highly pertinent policy questions in seeking to develop the next wave of regional innovation policy.

The Piedmont region is an old industrial region seeking to adjust to the knowledge economy

The Piedmont region formed a central part of the Italian industrial core, the so-called "first Italy", based around heavy engineering and manufacturing. This led to a period of boom in the post-war period based around rapid growth in the "sunrise" industries, serving growing consumer markets. These industries were typified by electronics, automotives and pharmaceuticals, and were dominated by large firms which sat at the centre of sectors of activity. These production complexes provided employment for all those that sought it. Their productivity growth underpinned rising standards of living and fuelled demand for more and innovative products. The region became accustomed to this success.

Although there cannot be talk of complacency in the region, from the time of the first oil shock in 1971, the fragility of its Fordist mass production system became evident. The large companies and sectors which dominated Piedmont's regional economy have slowly declined, at least in terms of their employment. This created a new challenge for the region: how to generate new employment to absorb those being released by these sectors. It is important not to over-stress the nature of this decline: the region is one of the top ten manufacturing regions in Europe as a percentage of all employment and in the Italian context has the highest levels of business investment in R&D. The region is clearly a centre of innovation for manufacturing, but there is increasing recognition that this is not enough to ensure continued social well-being and growth.

Innovation in Piedmont has become increasingly important, belatedly recognised by policy makers

There has been a long-term interest by policy makers in making the region a more fertile environment for creating and growing new businesses. In the last 30 years, figures from the regional Chamber of Commerce highlight how new small business "hotspots" have emerged in Turin's suburbs and in the city of Cuneo. However, at the same time, the last 30 years have seen the erosion of Piedmont's economic advantage with respect to the Italian and European average wealth levels. There has been a rising concern that creating new businesses is not enough to reverse this decline – there is a need to create innovative firms in novel sectors.

Manufacturing industry has been a key mechanism for Piedmont in coming to terms with the demands of the modern knowledge economy. However, policy makers are rightly concerned that the narrow focus of many of these sectors is a potential weakness and fragility for the continued economic success of the region. Augmenting the "sunrise" innovative clusters in Piedmont with new sectors and industries has become an increasingly pressing concern for policy makers. The search has shifted to looking at how the region's very strong public and private R&D base can be exploited to create new industrial sectors. The region has successfully "created" one industry in the last quarter century – co-ordinated public investments by municipalities, provinces and other public sector organs were precursors in the development of ICT consultancy.

Piedmont therefore offers an interesting laboratory to explore the new approach to innovation policy

In the last three years, Piedmont's regional government has announced a change in the direction of enterprise policy towards the creation of new high technology sectors and firms, drawing on existing technological assets in the region. This is intended to be part of a wider regional cultural shift away from being a branch-plant economy of employees towards a dynamic region of entrepreneurs. The ambition is to encourage potential and contemporary regional entrepreneurs to have much easier access to the resources necessary for successful high technology businesses. This is to be achieved by mobilising existing firms, laboratories, research groups and universities to support new businesses.

There is recognition at all levels that Piedmont's RIS has become overgrown in the last decade, fed by freely available European funds. The RIS is messy and confusing, but at the same time it is strong and coherent. The regional challenge is to make it work better for those entrepreneurs who are its intended targets. The challenge for the region is not a structural one, but much softer – changing the way the region approaches the business of innovation, within firms, within research institutions, and through collaborative partnerships. The region is, in short, the perfect prism through which to reflect in detail on some of the more general issues emerging around the "softer systemic" approach to innovation outlined above.

Notes

1 Boekholt, P. Arnold, E, & Tsipouri, L. (1998) "The evaluation of the pre-pilot actions under Article 10: Innovative Measures regarding Regional Technology Plans" Report to the European Commission, <Accessed through CORDIS database> <Available at: http://www.innovating-regions.org/download/RTPreport.pdf >; CEC (1996) The final evaluation of the Strategic Programme for Innovation and Technology transfer (SPRINT) 1989-1994 COM (96) 130, Luxembourg, Commission for the European Communities.; Charles, D. R., Nauwelaers, C., Mouton, B. & Bradley, D. (2000) Assessment of the Regional Innovation and Technology Transfer Strategies and Infrastructures (RITTS) scheme, Luxembourg, CEC.; DG REGIO (2006) "Innovation in the National Strategic Reference Frameworks" Working document of the Directorate General for Regional Policy, Brussels: DG REGIO.; DGXVI/ DGXIII (1994) The Regional Technology Plan guidebook, Luxembourg, Commission for the European Communities.; Innovating Regions in Europe (1999) Good practices on RITTS, RIS and RTP pilot projects across Europe, Luxembourg: IRE Secretariat.; Innovating Regions in Europe (2005) "Management of a RIS project: lessons from 10 years' experience" RIS Methodological Guide: Stage 0, Luxembourg: IRE Secretariat.; Innovating Regions in Europe (2006) "Management of a RIS project: lessons from 10 years' experience" RIS Methodological Guide: Stage 1, Luxembourg: IRE Secretariat.; Innovating Regions in Europe (2007) "Management of a RIS project: lessons from 10 years' experience" RIS Methodological Guide: Stage 2, Luxembourg: IRE Secretariat.; Nauwelaers, C. and Wintjes, R. (2002) Innovating SMEs and Regions: The Need for Policy Intelligence and Interactive Policies. Technology Analysis & Strategic Management, 14 (2): 201-215.; Sharp, M. (1998) 'Competitiveness and cohesion — are the two compatible?' Research Policy 27 pp 569- 588; Socintec/ INNO (2004) Ex-post evaluation of the RIS, RTTs and RISI ERDF innovative actions for the period 1994-99, Luxembourg, CEC.

Chapter 2

The Piedmont Region in an International Comparative Context

Introduction

Piedmont is – more so than other Italian regions – dependent on large firm centred production industrial groups, and has a comparatively lower density of small firm industrial districts which are often taken to characterise Italian economic structure. The region has faced considerable pressures from globalisation in recent decades. Large firms in the region have shed jobs, reducing overall employment levels whilst increasing the value-added of remaining positions. Small firms have faced the loss of these large firms as potential customers, and so the region's industrial districts have come under increased economic pressure. Whilst the year-on-year changes might be relatively small, the longer term trend has gradually emerged with the region locked into a downward economic spiral, as its comparatively high GDP levels have slowly but surely converged downwards with the Italian and European averages.

The Piedmont region is probably most famous for its best known corporation, the FIAT motor company, which makes Ferrari, Alfa Romeo, and Maserati cars alongside the eponymous brand. The FIAT corporation has played an important role in the growth of the city and region which have been the home of this firm, the city of Turin and the region of Piedmont. The firm came over time to dominate the regional production system, which itself evolved to accommodate the needs of this powerful industrial actor. The region is also home to a number of other large, successful and globally competitive businesses including *Alenia Aeronautica* (aerospace), Lavazza and Ferrero (agro-food), Zegna (textile), as well as a number of highly innovative SMEs such as Novamont and Mondo operating in the chemical and new materials fields.

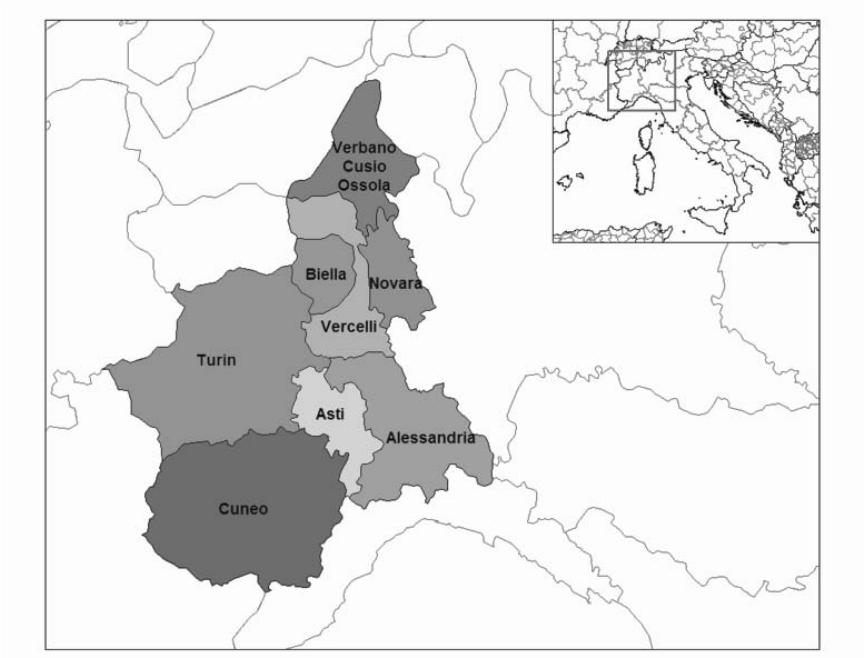
Although Piedmont has only enjoyed constitutional responsibility for the promotion of innovation since 2001, the regional scale is critical for the effective management of innovation. The regional approach chosen by Piedmont recognises the reality that innovation does not purely take place within regions, but also within wider production networks. The innovation policy focus taken by Piedmont has made much of its claims to be stimulating and supporting internal and external relationships. But regional innovation policy needs to make a sensitive balancing act between encouraging global innovation activities within regional boundaries, and ensuring that this global excellence fuses with local competencies to stimulate more general economic growth.

Piedmont, as a region, is facing the challenge of reversing an almost imperceptible economic decline, a long-term trend which has only slowly been accepted as the reality by key regional policy makers. The main cause of this has been a slow "hollowing-out" of regional production activities by firms across Piedmont's manufacturing base. Although these sectors have long driven the region's economic development, their contribution to cohesive regional economic growth is slowly dwindling. Nevertheless, many of these firms – and in particular their investments in R&D – are vital to the future of the region. Piedmont remains one of the hot-spots of private investment in R&D, and clearly has the foundations in place to reverse this decline.

The challenge for the Piedmont region is quite unusual as a case study in regional economic development. The region has not been abandoned by its traditional industrial base, so the challenge is not to create entirely novel economic sectors. Nor does the region have all the necessary foundations in place to sustain its position as a leading region in the European context. Yet, building those foundations requires a smart engagement with existing innovative businesses to try to create new firms and industries that may pose a threat to the region's existing industrial engine. Navigating a path between novelty and continuity is a great challenge, and the Piedmont experience has many lessons for regions elsewhere in Europe.

This chapter provides contextual information over Piedmont in a wider European context. The first part provides some basic information about the region in comparison with other Italian and European regions. The second section focuses on Piedmont's contribution to the Italian economy, whilst the third section looks at the evolution of the region's main industries in the last three decades. The fourth section sets out the sub regional geography of the region as an urban centric region with uneven internal development. The final section uses this information to benchmark Piedmont's future prospects, and identify the macroeconomic priorities which must be addressed to ensure the region's continued future economic success.

Figure 2.1. **The eight provinces comprising the region of Piedmont**



Source: Finpiemonte Background Report (2008).

More recently, the regional tier has risen in importance. Whilst regions have traditionally been comparatively weak actors in the Italian governance system, there have been concerted efforts in the last quarter century to give coherence to the regional tier. Part of this has been underpinned with a realisation of the importance of regions as the natural "space" for particular kinds of economic activity that are becoming more important.

The rise of the knowledge economy has placed a premium on innovative activities as the driver of productivity growth and for rising well-being. It is likewise widely acknowledged that innovation is profoundly influenced by the geographical context in which it takes place. Innovation takes place through interactive processes within which novel ideas are transformed into new products, processes and techniques. Innovation involves the application of new knowledge to existing corpuses of understanding, which has in turn placed a premium on types of knowledge that are not easily transferred over space.

Figure 2.2. **The region of Piedmont in the Italian context**

Even with the rise of new information and communications technologies (ICTs), the transfer of economically useful knowledge is not always a cheap or a simple process. Some kinds of knowledge, using Nonaka's classification such as "know-what" and "know-why" can easily be codified into encyclopaedias, journal articles, and directories. New ICTs have made the transmission of these codified forms of knowledge almost free at the point of use. But other forms of knowledge, such as know-how, and know-who, are not so easily codified, and are often referred to as tacit knowledge.

The transfer of tacit knowledge involves processes of "learning by doing" and interactive knowledge exchange. Effective tacit knowledge transfer often relies on the establishment of inter-personal relationships, trust and communications between actors. Repeated interaction between partners has been recognised as one important contributory factor in facilitating the effective transfer of tacit knowledge.

The places where tacit knowledge is effectively transferred become places where particular kinds of innovation are realised. Also, because even with rising inter-continental mobility, the reality of regular interaction lies within individuals' lived experiences. The region is a "natural space" for these kinds of interaction, and hence for the effective promotion of innovation.

But there is also recognition that these regions are embedded in wider economic and spatial systems which influence their quality of place. Likewise, regions are not homogenous, and effective territorial development requires managing sub-units to maximise regional performance in a way that fits with the wider space within which the region is embedded.

Piedmont is a node in Italy's polycentric urban system

Taking a multi-level view of the rise of the Italian regions, it is clear that there are a range of scales which have influenced the development of Piedmont and influence the functioning of its regional tier. On a European level, north Italy lies at the eastern end of the so-called "blue banana" of the competitive urban core of Western Europe, running from London in the west, through Amsterdam and Paris, through Stuttgart to the northern Italian cities. Some commentators have argued for the existence of a transalpine science Euro region encompassing the North Western Italian regions along with Rhone-Alpes and Provence-Alpes-Côte-d'Azur (PACA).

The reforms to the Italian constitution have gradually increased the responsibilities of the regions. Piedmont is faced with the challenge of using these new powers and portfolios to create the best possible environment for creative and interactive innovation. The region has a strong economic structure, although its comparative economic advantage over the European and Italian averages has dwindled in recent years. Nevertheless, Piedmont is an important and comparatively large region.

The Italian national state emerged in the 19th century, in a process similar to German unification. A collection of flourishing medieval city-states with their own strong local economies coalesced after the Treaty of Westfalia into a handful of kingdoms in the 19th century, again with their own strong urban centres and economies. The effects of this remain visible to this date with the strong poly-centric pattern of urbanisation across Italy. Below the capital city of Rome and the largest metropolitan area of Milan, there is a tier of similar sized cities with between 2 and 4 million residents, including Turin, the capital of the Piedmont region. These cities are the anchors for their regions, and Piedmont is dominated economically, politically, socially and culturally by the city of Turin.

The population of the Italian regions and their growth 1990-2006 is shown in Table 2.1. Although one of the larger regions, its population growth has been far lower than the Italian average, particularly the most economically successful regions, including the two northern autonomous provinces of Trento and Bolzano-Bozen but also Emilia-Romagna and Veneto.

Table 2.1. **Population and change 1990-2006, by Italian region**

	Pop (m)		%
	1990	2006	Change 1990-2006
Piedmont	4.32	4.34	0.4%
Valle D'Aosta	0.11	0.12	8.4%
Liguria	1.69	1.61	-5.0%
Lombardy	8.84	9.48	7.2%
Autonomous Province of Bolzano-Bozen	0.44	0.48	10.3%
Autonomous Province of Trento	0.45	0.50	12.7%
Veneto	4.36	4.74	8.6%
Friuli-Venezia Giulia	1.20	1.21	0.7%
Emilia-Romagna	3.90	4.19	7.3%
Tuscany	3.53	3.62	2.5%
Umbria	0.81	0.87	7.2%
Marche	1.42	1.53	7.5%
Lazio	5.12	5.30	3.7%
Abruzzo	1.24	1.31	5.0%
Molise	0.33	0.32	-2.9%
Campania	5.61	5.79	3.3%
Puglia	4.01	4.07	1.5%
Basilicata	0.61	0.59	-2.8%
Calabria	2.08	2.00	-3.7%
Sicily	4.97	5.02	1.0%
Sardinia	1.64	1.66	1.1%
Italy	56.69	58.75	3.6%

Source: OECD Regional Database.

A particular challenge for Piedmont is the ageing and greying of its workforce. Table 2.2 shows the comparative breakdown of the region's population structure in 2006; the two thirds of the population in the economically active age cohort is in line with the Italian average, although there are an above average number of retirees in the region.

Table 2.2. **Population in 2006 by region and age class**

	0-14	15-64	65+
Piedmont	12.4%	65.1%	22.4%
Valle D'Aosta	13.2%	66.6%	20.2%
Liguria	11.1%	62.4%	26.5%
Lombardy	13.6%	66.9%	19.4%
Autonomous Province of Bolzano-Bozen	17.0%	66.4%	16.6%
Autonomous Province of Trento	15.3%	65.9%	18.7%
Veneto	13.9%	66.9%	19.2%
Friuli-Venezia Giulia	12.0%	65.4%	22.6%
Emilia-Romagna	12.5%	64.8%	22.7%
Tuscany	12.1%	64.7%	23.2%
Umbria	12.5%	64.3%	23.3%
Marche	13.1%	64.4%	22.6%
Lazio	13.9%	67.0%	19.1%
Abruzzo	13.4%	65.3%	21.3%
Molise	13.4%	64.7%	22.0%
Campania	17.5%	67.2%	15.3%
Puglia	15.7%	67.0%	17.3%
Basilicata	14.5%	65.7%	19.9%
Calabria	15.3%	66.5%	18.3%
Sicily	16.2%	65.9%	18.0%
Sardinia	12.9%	69.5%	17.6%
Italy	14.1%	66.2%	19.7%

Source: OECD Regional Database.

The greying of the population is something which all advanced economies face as increasing number of citizens retire whilst the number active in the labour market falls. Since 1990, there appears to have been a strong shift in the composition of the population of Piedmont, reflecting an ageing of the population. Whilst the population within and moving into the workforce has been steadily declining, there has been a huge growth of those over 65 years of age. Piedmont is in the bottom quintile for demographic evolution of Italian regions. This situation raises questions about the long-term sustainability of the region's workforce, and the need to maximise workforce participation and as well as the productivity of those in the workforce.

Table 2.3. **Population and change 1990-2006 by age class**

	1990	2006	
0-14	582 063	539 099	-7.4%
15-64	3 014 562	2 828 620	-6.2%
65+	727 548	974 014	33.9%
Total	4 324 173	4 341 733	0.4%

Source: OECD Regional Database.

Table 2.4. **Demographic evolution in the Italian regions, by age class, 1990-2006**

	0-14	15-64	65+	Total
Autonomous Province of Trento	11.3%	8.0%	34.5%	12.7%
Autonomous Province of Bolzano-Bozen	3.8%	5.7%	45.1%	10.3%
Veneto	-0.3%	3.4%	43.0%	8.6%
Valle D'Aosta	3.8%	2.1%	41.1%	8.4%
Marche	-6.2%	2.7%	37.3%	7.5%
Italy	-13.0%	0.1%	38.9%	3.6%
Piedmont	**-7.4%**	**-6.2%**	**33.9%**	**0.4%**
Basilicata	-30.2%	-3.4%	40.4%	-2.8%
Molise	-26.9%	-3.9%	26.4%	-2.9%
Calbria	-32.6%	-1.19%	36.6%	-3.7%
Liguria	-5.5%	-12.8%	20.7%	-5.0%

Source: OECD Regional Database.

Piedmont has consistently lower unemployment

Piedmont is a region with a strong industrial base, and has been strong in creating new jobs. Its employment rate in the period 1999-2006 fell from 7.3% to 4.0%. This rate of decline was broadly in line with overall Italian performance, although what is notable is that during this period less performing regions saw larger falls in unemployment than the more successful regions. So whilst unemployment in Calabria, Sardinia and Sicily halved, in the already stretched labour markets in the most northerly regions, unemployment fell by much less, or in Bolzano-Bozen, actually rose slightly. This is shown in Table 2.5.

Table 2.5. **Unemployment rate for selected Italian regions, 1999-2006**

Unemployment Rate for Italian Regions, 1999-2006		
Region	1999	2006
Autonomous Province of Bolzano-Bozen	2.5%	2.6%
Valle D'Aosta	5.3%	3.0%
Autonomous Province of Trento	4.3%	3.1%
Emilia-Romagna	4.6%	3.4%
Friuli-Venezia Giulia	5.6%	3.5%
Lombardy	4.8%	3.7%
Piedmont	**7.3%**	**4.0%**
Veneto	4.5%	4.0%
Calabria	28.0%	12.9%
Sicily	24.5%	13.5%
Sardinia	21.0%	10.8%
Italy	**11.4%**	**6.8%**

Source: OECD Regional Database.

Job creation has been strong, labour force growth relatively weak

This drop in unemployment has been very strongly driven in Piedmont by rising numbers in employment, although there has been a slight countervailing tendency for shrinkage in the size of the labour force in the region in comparison to the Italian average of growth by 5%. Table 2.6, decomposes the fall in unemployment shown in Table 2.5 into components which can be explained by changes in numbers of jobs and by a change in the size of the overall labour market, benchmarked against the changes across Italy as a whole.

Piedmont's overall unemployment change has been very positive in comparison to the changes nationally. Of the northern regions, only Liguria has performed strongly, on the basis of strong employment growth and a slightly declining labour force. The southern regions have performed very strongly on employment growth, against a background of otherwise shrinking labour markets.

Table 2.6. **Comparative labour market performance in reducing unemployment rates 1999-2006 by region (benchmarked to national performance)**

	Rate change	Job change	Labour Force change
Piedmont	106.8	108.6	98.3
Valle D'Aosta	105.0	105.6	99.4
Liguria	122.8	126.1	97.3
Lombardy*	77.4	74.1	104.2
Autonomous Province of Bolzano-Bozen*	56.7	54.9	103.3
Autonomous Province of Trento*	84.0	81.0	103.5
Veneto	66.7	63.6	104.7
Friuli-Venezia Giulia	93.8	92.3	101.6
Emilia-Romagna*	80.3	78.0	102.9
Tuscany	89.0	86.9	102.4
Umbria	88.8	85.2	104.1
Marche	79.9	77.2	103.4
Lazio	92.0	90.3	101.9
Abruzzo	91.6	88.0	104.0
Molise	96.6	105.4	90.9
Campania	109.5	118.2	92.1
Puglia	88.2	93.7	93.7
Basilicata	96.6	99.8	96.7
Calabria	129.2	142.8	89.5
Sicily	107.6	114.8	93.3
Sardinia	115.2	116.2	99.1
Italy	-68%	-60%	5%

* *Note*: these four regions had an unemployment rate of less than 5% in 1999, and their poor performance could be a result of existing tight labour market conditions not adequately compensated for by labour market growth in this period, when all four did experience above average labour market growth during this period.

Source: OECD Regional Database.

Piedmont's contribution to the Italian economy

Italy's sub national economic structure consists broadly of three macro regions, the north, the centre and the south (including the Islands). The southern regions remain relatively underdeveloped and comparatively poor, although long in receipt of national and European corrective subsidies. The central regions of Tuscany, Emilia-Romagna and Lazio have emerged more recently as relatively strong economies on the basis of new types of

production including flexible production networks as well as business services. The northern regions together form the "First Italy", the classic heavy industrial core which has provided the motor of the Italian economy. Piedmont is a key part of this industrial base, home to important automotive, ICT and engineering sectors.

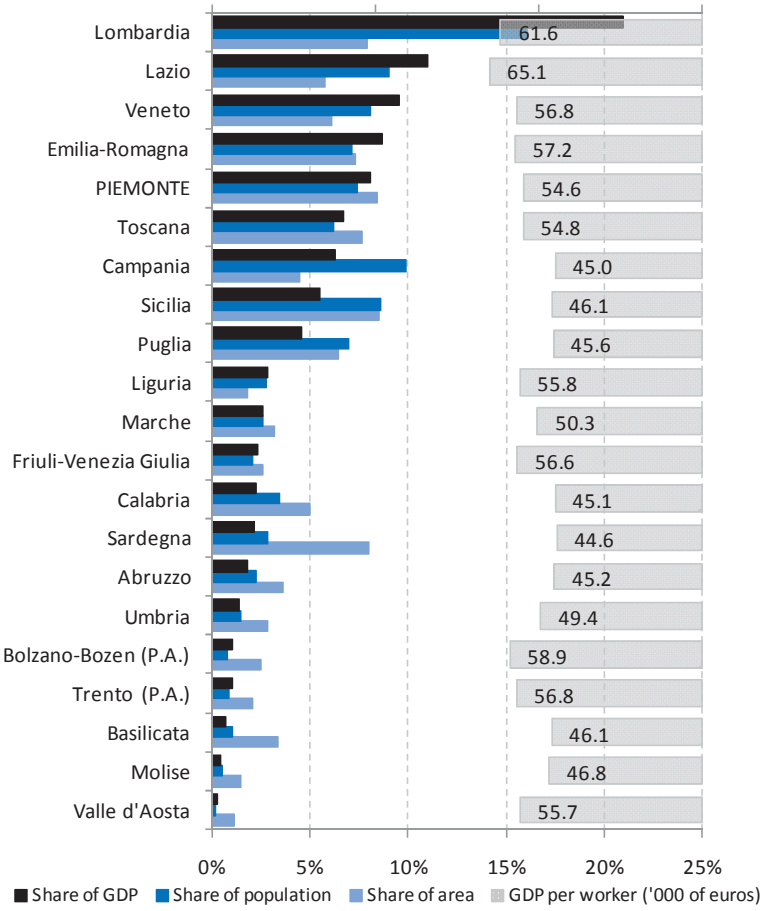
Piedmont is part of Italy's industrial engine

Piedmont is the fifth largest region in terms of the economic contribution which it makes to Italy's gross domestic production. Its regional productivity is above the Italian average, along with the other northern industrial regions with which it shares much in common. The largest Italian region both in terms of population but also contribution to national production is Lombardy. Lombardy's capital city, Milan, already plays an important capital city function for North West Italy as a whole, which potentially may limit Turin's possibilities to act as a second tier regional capital. The data on capital city functions (public service employment, knowledge intensive business services, and financial services) suggests that Milan's strength in this area has been increasing in recent years (OECD, 2006).

Piedmont entered a period of economic crisis in the late 1980s as the region's large firms began restructuring and reducing their employment. Although this was seen across a range of sectors including ICT and chemicals, the most notable restructuring took place in FIAT. From the 1970s onwards, Fiat's efforts to maintain its competitiveness reduced its regional embedment, both in terms of regional employment and as well as purchasing through regional supply chains. This in turn created problems for the firms which oriented themselves towards the region's main industrial sectors which in turn induced employment falls in these firms.

Throughout the 1980s, these pressures percolated through the main industrial districts of Piedmont, resulting in falling levels of intra-regional commercial relationships within supply districts, as well as falling employment in these sectors. FIAT reduced its employment in the region from 92 000 to 47 000 in the period 1986-1996. Averaging 4 500 jobs per year in a city-region of 2.2 million people, this figure was high if unremarkable, and FIAT's continued commitment to the region rendered it impossible to argue that public policy should begin to assume a post-FIAT future for Piedmont. The other technology sectors in the region have faced comparable pressures over a similar timescale, with the compounded effect being a steady erosion of Piedmont's industrial base.

Figure 2.3. **Regional contribution to Italy – share of GDP, population, and area (2005)**



Source: OECD Regional Database.

There has been a significant substitution of employment, but from the mid 1990s onwards, there has been evidence that the Piedmont economy is losing ground with regard to the Italian average. These figures are partly distorted by the high rates of growth experienced by the 12 new member states as they underwent market liberalisation and restructuring.

Table 2.7. **The relative convergence of Piedmont with the Italian and EU GDP levels 1995-2005**

Year	EU 27	Italy	NW Italy	Piedmont
1995	100	121.3	151.4	142.5
1996	100	120.5	150.5	140.6
1997	100	119.3	149	139.5
1998	100	120	149.9	139.6
1999	100	117.8	146.4	137.9
2000	100	117.1	144.6	130.8
2001	100	118.1	145.7	130.6
2002	100	112.2	138.4	123.5
2003	100	111	137.1	122.8
2004	100	106.8	131.1	118.2
2005	100	104.8	127.3	114.7

* Measured using GDP *per capita* at Purchasing Power Standard indexed to EU27=100.

Source: Eurostat; OECD Regional Database.

Not all regions have experienced the same relative shift with respect to the European average (for many Italian regions, notably those in the south, this represents a divergence rather than convergence). The region which has performed best has been Lazio, whilst Piedmont is among the poorest performing, with only Bolzano-Bolzen and Valle d'Aosta performing worse. This data hints at the declining competitive position of Piedmont with respect to its competitor regions.

Table 2.8. **The relative performance of the best and worst performing Italian regions against the European GDP level**

Region	1995	2005	Change
European Union (27 countries)	100	100	0.0%
Lazio	136.6	127.9	-6.8%
Calabria	72.3	67.5	-7.1%
Basilicata	82.8	74.3	-11.4%
Sardinia	89.6	80.1	-11.9%
Tuscany	131.6	114.2	-15.2%
Autonomous Province of Trento	152.4	122.7	-24.2%
Piedmont	**142.5**	**114.7**	**-24.2%**
Autonomous Province of Bolzano-Bozen	170.7	136.7	-24.9%
Valle d'Aosta/Vallée d'Aoste	167	123.2	-35.6%

Source: OECD Regional Database.

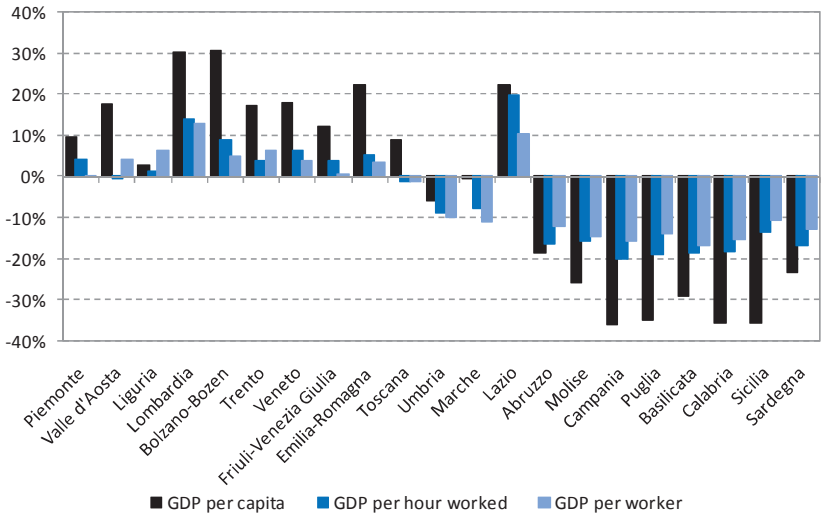
The main explanation for this general economic decline is that there has been a relative decline in the Piedmont industrial base with respect to its main competitor regions. There are many innovative companies that are investing heavily in new products in Piedmont. Unlike in previous eras, local investment in R&D has not been matched with significant local employment creation. This has increased the productivity of the remaining industrial base, but not created the anticipated growth of previous decades. The Piedmont "paradox" is precisely this high investment in R&D alongside comparatively low employment growth. The issue for Piedmont could be seen to be a limited capacity to absorb the positive knowledge spillovers which emerge from its industrial base. There are several indicators which further corroborate this notion of an "absorption capacity" problem, including both its educational levels as well as the overall productivity performance of its industrial base.

Regional productivity is good, worker productivity is weaker

Piedmont is a hard-working (high employment) region in the Italian context, with a relatively low unemployment rate as well as relatively high productivity levels. However, one characteristic of the inherited industrial structure is that individual worker productivity is relatively low, notably in comparison to the other northern Italian regions. Although there are some capital-intensive and high productivity sectors in the region, notably the automotive sector, productivity per worker overall is lower than elsewhere in the northern and central regions (for example Lombardy, Emilia-Romagna), both in terms of number of workers and productivity per hour.

This reflects the fact that many jobs have been shed in these capital intensive sectors, to be replaced in much less knowledge intensive and innovative sectors. This is further exacerbated by the relatively weak growth of knowledge intensive business and technical (producer) services (KIBTS) in the region. The importance of KIBTS to regional productivity levels in Italy is demonstrated in Lazio, which has higher than average productivity levels, largely on the back of its very strong banking and business services sector. Although Piedmont has a strong demand for these services deriving from its industrial base, its proximity to Milan has meant that Lombardy has met much of the demand for these sectors. The fact that KIBTS have a much higher productivity level than low technology manufacturing and assembly jobs contributes to the region's relatively poor productivity. The relative productivity levels of the Italian regions are shown in Figure 2.4.

Figure 2.4. **Comparison (in gaps from the country average) for GDP per capita, GDP per worker and GDP per hour worked**



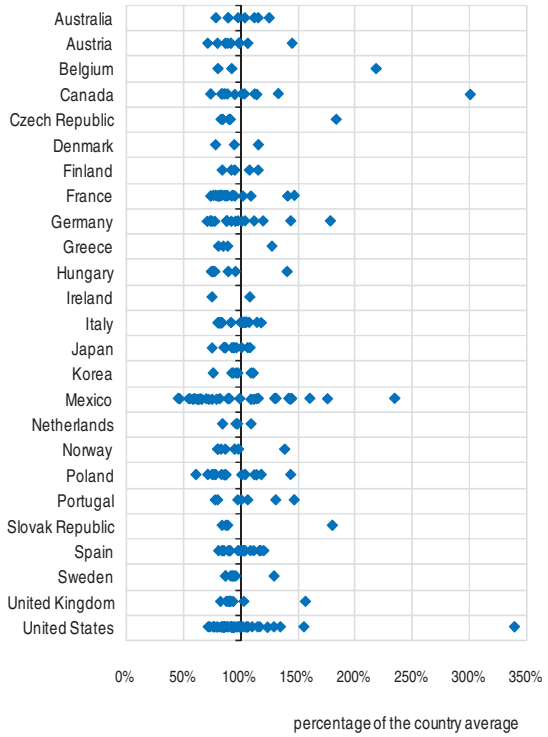
Source: OECD Regional Database.

Piedmont is strong in a comparatively evenly developed state

The macro-regional geography of Italy is visible in the charts and tables already presented, highlighting the split between a strong industrial north, a buoyant central area and a much weaker and relatively underperforming southern region. However, despite these persistent inter-regional differentials, it is important not to exaggerate their significance within Italy. Although the south of Italy has a (possibly underserved) reputation as a slow developing area, within the wider EU context, Italy's overall inter-regional differentials are comparatively low.

As Figure 2.5 shows, Italy's regions are tightly clustered around the average GDP, between 75% and 125% of the national average. This is certainly in contrast to other advanced economies, reflecting on the one hand Italy's poly-centricity, with an economically successful band (the "First Italy") spread across the northern regions including Piedmont, Lombardy, Liguria and Veneto, rather than a core capital city region, such as London (UK), Île-de-France (France) or Distrito Federal (Mexico). On the other hand, it also reflects the fact that many of the regions are of a similar size, and there are no city-states within its borders distorting the overall picture, such as Hamburg (Germany) or Prague (Czech Republic).

Figure 2.5. **Regional dispersion in GDP per worker**



Source: OECD Regional Database.

This inter-regional inequality can be expressed as a coefficient of variation, and when this variable is calculated for OECD states, it then becomes evident that only Japan, Korea, Finland and the Netherlands have lower inter-regional inequality. These are all states which have taken a strongly interventionist line towards reducing inter-regional inequality. Japan's government has invested heavily in public works as part of an effort to revive its stagnant economy. Korea has actively targeted decentralisation from Seoul, developing alternative growth poles across its territory. The Netherlands is a relatively small state where there is strong internal commuting and an active regional development policy compensating for these inequalities. Finland likewise has an active regional development policy aimed at avoiding depopulation of remote rural communities and inflationary growth around Helsinki.

Table 2.9 also emphasises that whilst there was some expansion in inter-regional inequality in the period 1999-2005, Italy remains one of the

most spatially equal of OECD member states in terms of GDP per worker – inter-regional inequality is more driven by differences in unemployment rates than structural economic differences in productivity levels per worker. Its level of regional productivity dispersion is on a par of that with Spain, and it is interesting that both Spain and Italy in the last decade have undergone their own programmes of political devolution, creating the regions as significant political actors with considerable responsibilities in the field of innovation policy, amongst other things.

Table 2.9. **Changes in inter-regional inequality in OECD member states, 1999-2005**

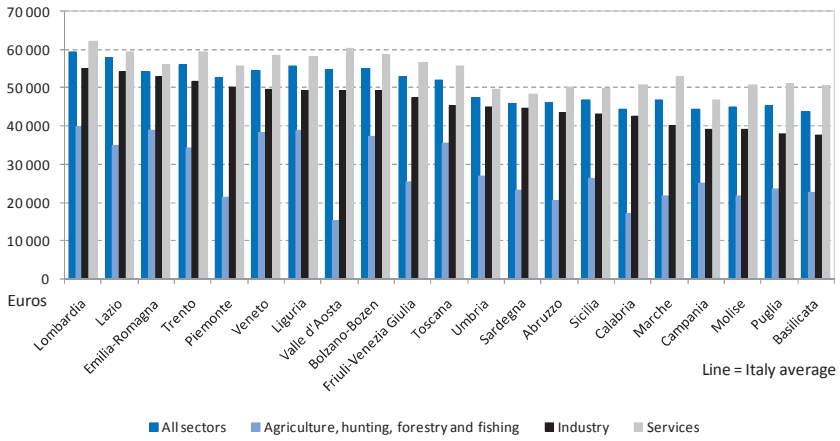
	Coefficient of variation 1999 & 2005		
	1999*	2005**	Growth (%)
Australia	0.07	0.13	100.5
Austria	0.19	0.21	9.7
Belgium	0.49	0.48	-2.2
Canada	0.37	0.33	-11.8
Czech Republic	0.28	0.33	18.3
Denmark	0.15	0.16	10.4
Finland	0.15	0.10	-37.2
France	0.12	0.21	73.1
Germany	0.29	0.29	1.6
Greece	0.04	0.22	483.1
Hungary	0.23	0.27	17.0
Ireland	0.15	0.18	19.2
Italy	0.10	0.12	17.5
Japan	0.10	0.11	10.4
Korea	0.11	0.11	1.8
Mexico	0.45	0.43	-4.3
Netherlands	0.09	0.09	-7.7
OECD Average	0.21	0.23	7.5
Norway	0.21	0.20	-6.4
Poland	0.20	0.24	18.1
Portugal	0.19	0.22	16.1
Slovak Republic	0.32	0.43	31.0
Spain	0.12	0.12	0.3
Sweden	0.17	0.14	-15.7
Turkey	0.37	na	na
United Kingdom	0.17	0.19	11.6
United States	0.31	0.34	10.5

Source: OECD Regional Database.

Piedmont is productive in industry, weaker on services

Piedmont is a comparatively traditional manufacturing region which has only slowly and relatively recently begun to develop alternative sources of economic strength. In part, this has been because its manufacturing sectors have been very strong, although in comparative terms their productivity per worker is relatively low. The service sector in Piedmont is also relatively smaller in scale than that in other leading regions. Figure 2.6 shows that two larger regions lead service productivity, Lombardy and Lazio, the capitals of which have national (and international) roles as centres for knowledge intensive technical and business services.

Figure 2.6. **Value added per worker by sector (Euros)**



Source: OECD Regional Database.

In 2005, the Piedmont region's productivity was 10% above the Italian average. Table 2.10 decomposes this 10% difference into the different elements of labour productivity. This table shows that productivity per hour worked is slightly below the Italian average. What made all the difference was what could be known as the "enthusiasm" variable: workers in Piedmont work longer hours, there are more of them in employment, and more of them seeking work, than elsewhere in Italy.

Table 2.10. **Components of Piedmont's difference from Italian productivity levels**

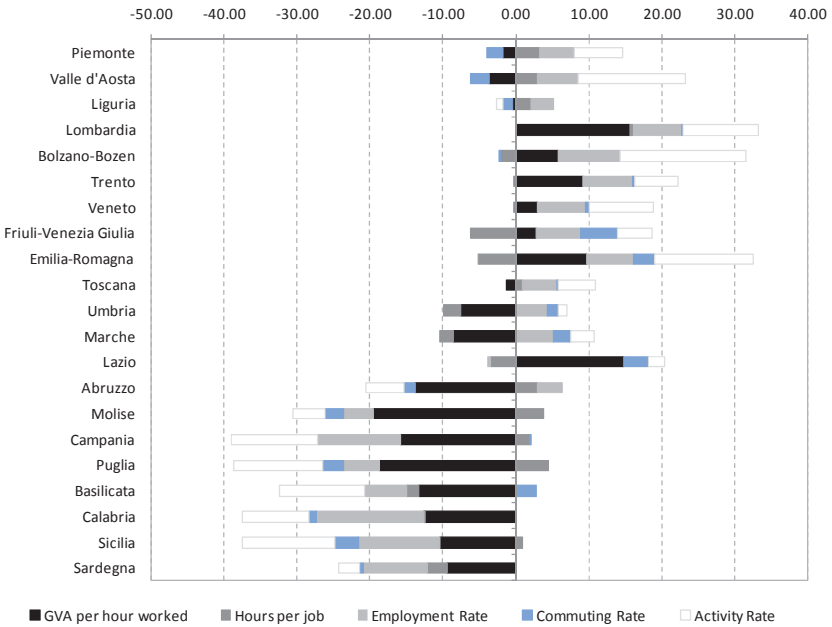
GVA per hour worked	-1.50
Hours per job	1.50
Employment Rate	3.17
Commuting Rate	-0.06
Activity Rate	6.01

Source: OECD Regional Database.

By contrast, in Lombardy and Emilia-Romagna, it is primarily higher activity rates that drive their high productivity levels. With relatively low unemployment levels, already high labour market participation and an ageing population, it is clear that Piedmont can only improve its economic performance by increasing hourly productivity rates.

This involves upgrading existing employment opportunities and the human capital levels of those employed, and translating them into higher business productivity. The challenge for the region, therefore, appears to be bringing about an increase in the number of more highly skilled individuals and bringing them together with increasingly innovative businesses to increase the region's overall productivity level.

Figure 2.7. **Factors contributing to differences in regional GVA per head from the Italy average in 2005: NUTS2 regions**



Source: OECD Regional Database.

Piedmont's workers are educated for the 20th not the 21st century

The strong influence of the automotive sector has created a large working class labour force. In common with workers in similar regions elsewhere, such as Wales (UK), Twente (Netherlands) and the Basque Country (Spain), the educational requirements for these jobs are comparatively low (Fikkers, 2008). Although the jobs themselves demand skilled workers, many of the skills are developed through training in the workplace rather than the formal educational system. In such places there has been a tendency for educational levels to remain relatively low.

However, the new sectors which are emerging impose stronger demands for more highly skilled workers, and the skills demands placed on those employed in the traditional manufacturing sectors are also rising. Increasing the educational level of the industrial population represents an important challenge for these regions, and one to which it is difficult to respond effectively, because of the often invisible evolution in the nature of employment opportunities and the long-term effects of individual educational choices on possibilities for further education.

It is harder to precisely enumerate the current human capital problem, because the system is in a great deal of flux. A reform in 1999 of the first degree programme in response to the Bologna requirements introduced a set of changes to the Italian system of higher education:

- the introduction of the "credit" system in the planning of educational programmes;
- the promotion of new educational courses (stages, laboratories, etc.);
- the grouping of university courses into "classes;
- a new organisation of tertiary titles.

The novel organisation of the titles, in particular, led to the possibility for students to attain a first university degree after a three year programme (*laurea triennale*) – rather than the previous 4/5 years – and a second degree after a further two-year programme (*laurea specialistica*).

This changed the standard five year degree to a three year bachelor and two year master degree. There has been a one-off increase in the number of people going to university in response to these reforms, because university no longer involves a time commitment of five years simply to achieve a degree. This has increased access rates to higher education. Furthermore, many professionals already present in the labour market decided to enrol on

university courses in order to improve their educational qualifications. There has been a huge increase in the number of Italian graduates since this reform process commenced.

Table 2.11. **The changing proportion of the Italian labour market with a higher level qualification (graduate/ postgraduate), top five and bottom five regions**

Region	1999 (%)	2000 (%)	2001 (%)	2002 (%)	2003 (%)	2004 (%)	2005 (%)	2006 (%)
Piedmont	2.4	7.7	11.0	11.3	11.2	11.9	12.6	13.5
Calabria	3.7	11.5	15.6	15.4	16.2	18.2	19.0	19.3
Umbria	3.1	9.6	13.6	13.8	14.5	17.2	16.9	17.0
Abruzzo	3.2	9.0	11.9	13.2	13.7	15.5	15.3	16.6
Campania	2.6	8.2	11.3	13.3	12.9	16.5	16.5	16.5
Tuscany	3.1	9.4	12.0	12.0	12.3	13.5	15.1	16.2
Friuli-Venezia Giulia	2.6	7.8	11.3	11.7	11.5	11.7	11.9	13.5
Puglia	2.5	7.7	10.3	10.2	10.5	11.5	12.8	12.9
Valle D'Aosta	0.0	6.4	9.5	8.8	9.0	11.5	12.2	12.9
Trento	2.3	6.9	10.1	10.0	11.3	11.3	11.2	12.5
Marche	1.8	5.6	7.9	8.6	9.6	10.3	11.0	10.4

Source: OECD Regional Database.

The figures for workforce qualification by ISCED level in 2006 show that there is a fairly common pattern across Italy of around 40% unskilled, 45% with a high school or lower further education qualification, and 15% with a graduate degree. The Higher Education Observatory for the Piedmont region anticipates that these reforms will, in the long run, increase the overall qualification level to around 30% of the workforce gaining at least a bachelor degree. This increase will be due to both higher enrolment levels and completion rates. Of that 30%, the 15% who would previously have enrolled in a higher education institution will complete their Masters degree.

Table 2.12. **The educational level of the regional workforces in Italy, 2006**

	Unskilled*	High school	Graduate
Piedmont	40%	46%	14%
Valle D'Aosta	47%	39%	13%
Liguria	35%	48%	17%
Lombardy	38%	47%	15%
Autonomous Province of Bolzano-Bozen	48%	42%	10%
Autonomous Province of Trento	33%	52%	15%
Veneto	41%	46%	13%
Friuli-Venezia Giulia	35%	49%	15%
Emilia-Romagna	39%	46%	15%
Tuscany	41%	43%	16%
Umbria	32%	52%	17%
Marche	39%	44%	16%
Lazio	31%	50%	19%
Abruzzo	35%	48%	16%
Molise	40%	44%	16%
Campania	46%	39%	15%
Puglia	48%	39%	13%
Basilicata	41%	45%	14%
Calabria	43%	41%	16%
Sicily	47%	39%	14%
Sardinia	50%	37%	12%
Italy	40%	45%	15%

* Unskilled corresponds to ISCED 0-2, High school to ISCED 3-4, and Graduate to ISCED 5-6.

Source: OECD Regional Database.

Italy is a relatively weak performer in terms of its educational levels, as Table 2.13 makes clear. Italy ranks 27th of the 30 members in terms of the percentage of its workforce aged 25-65 who are qualified to graduate level – half the overall OECD average. This is clearly a problem for Italy and Piedmont who must ensure that the workforce possesses the necessary skills to respond to new employment opportunities, thereby increasing knowledge absorption capacity.

Table 2.13. **The relative educational levels of OECD members, 2007**

		Unskilled	High school	Graduate
1	Belgium	15	39	46
2	Canada	15	39	46
3	Japan	0	60	40
4	United States	13	49	38
5	Finland	21	44	35
6	Denmark	17	50	34
7	Norway	22	45	33
8	Korea	25	44	32
9	Australia	35	34	31
10	Iceland	31	40	31
11	Netherlands	29	41	31
12	Sweden	17	54	30
13	United Kingdom	14	56	30
14	Ireland	35	36	29
15	Switzerland	13	58	29
16	Spain	51	20	28
17	Luxembourg	28	46	27
18	New Zealand	21	52	27
19	France	33	42	25
20	Germany	17	58	25
21	Greece	40	39	21
22	Austria	19	63	18
23	Hungary	24	60	17
24	Poland	15	69	17
25	Mexico	79	6	15
26	Czech Republic	10	77	13
27	**Italy**	**49**	**38**	**13**
28	Portugal	74	14	13
29	Slovak Republic	15	73	13
30	Turkey	73	17	10
	OECD average	29	45	26

Source: *http://www.niassembly.gov.uk/io/research/2007/1107.pdf.*

Two caveats are necessary when arguing that Italy and Piedmont have a very low comparative educational level. The first is that there have recently been significant reforms to the higher education system which are only now beginning to be reflected in the statistics for workforce qualification levels.

Those who began their studies in 1999 are only now entering the 25-64 cohort measured by these statistics, and there has been a major increase in the number of graduates in the labour market from 1992-2002. Moreover, some countries have higher reporting rates because higher vocational courses are classed as higher education, whereas in Italy such courses are considered as lower qualifications.

The second caveat is the persistence of the idea of the Italian "exception", *i.e.* that the nature of the Italian economic structure means that traditional measures of human capital are insufficient to precisely describe the characteristics of the Italian economy which have driven its historically high levels of productivity growth. The idea of the "Italian exception" maintains that Italian industrial districts have high levels of social capital between workers and employers which give them a flexibility that other places purchase through investment in research and education. This argument applies less to the Piedmont region than to other regions, principally because Piedmont's economic structure is dominated by large industrial groups rather than the industrial districts common elsewhere in Italy. Nevertheless, it is clear that there is a problem with human capital in Piedmont.

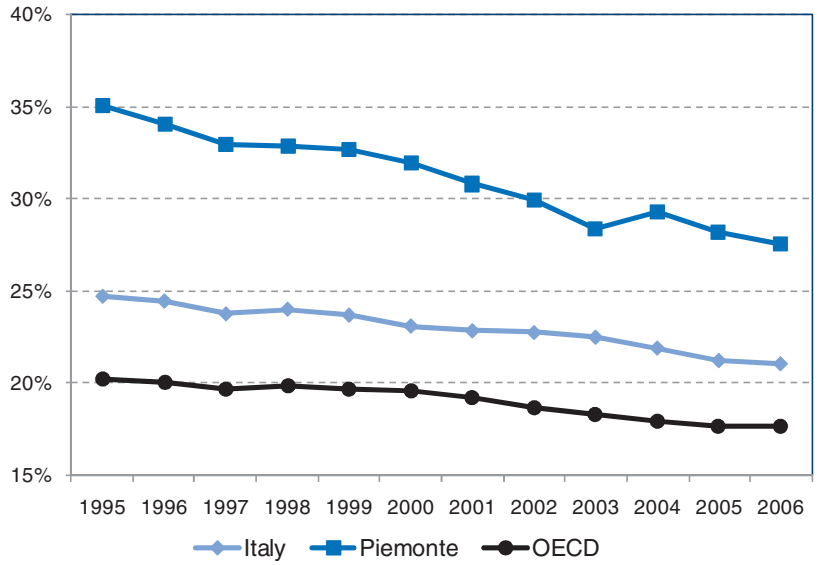
The evolution of Piedmont's high technology sectors

The 1990s were a tough decade for Piedmont as its established sectors underwent restructuring. The region lost some ground on its competitors in terms of general competitiveness and in terms of some underlying competitiveness drivers and the region continues to under-perform. During the 1990s, the first elements of new industrial sectors became visible in Piedmont and existing firms restructured towards knowledge intensive and innovation intensive growth. The region is starting to make some headway in addressing the reverses of earlier periods.

Manufacturing is a strong but declining sector for Piedmont

The dominant feature of industrial change in Piedmont in the last decade has been the continued decline of the manufacturing sector. There has been an overall shift in the number of positions in the region from over one third of all jobs to just over a quarter. There has also been an absolute, as well as a relative, decline in the number of manufacturing jobs in the region, from around 600 000 in 1995 to 520 000 in 2005. These declines have been mirrored across Italy and other OECD members, and despite these shifts, manufacturing remains a comparatively strong source of employment and growth in Piedmont.

Figure 2.8. **Evolution of employment in manufacturing as percentage of total employment (1995-2006)**



Note: the OECD average does not include: Austria, France, Hungary, Japan, Poland, Sweden and Turkey.

Source: OECD Regional Database.

Piedmont remains a very strong manufacturing region, a fact indicated by its position in the top decile of European regions for manufacturing size, that is more than 90% of the EU labour force is located in regions where manufacturing is proportionately less important than in Piedmont. Out of 135 EU regions, Piedmont ranks 16th. The geography of this list is distinctive, covering heavy industrial regions in post-socialist states, plus Baden-Württemburg as well as six Italian regions. This highlights the continuing importance of manufacturing to Piedmont, as well as the fact that the region is now increasingly in competition with lower cost manufacturing regions.

Table 2.14. **The top 20 EU (NUTS one or equivalent) regions for manufacturing jobs as a proportion of all employment, 2006**

Region/ Country	All jobs	Mfrg jobs	%	Rank
Severovýchod	698.8	264.8	37.9	1
Střední Morava	566.2	205.4	36.3	2
Moravskoslezsko	536.9	191.8	35.7	3
Západné Slovensko	842.6	280.1	33.2	4
Jihozápad	571.5	189.4	33.1	5
Severozápad	506.1	167	33.0	6
Jihovýchod	755.7	243.8	32.3	7
Baden-Württemberg	5 185	1 661	32.0	8
Marche	647	204.1	31.5	9
Dunántúl	1 245	387.7	31.1	10
Macroregiunea unu	2 159	670.6	31.0	11
Stredné Slovensko	551.7	167.6	30.4	12
Veneto	2 101	635.2	30.2	13
Lombardy	4 273	1 252.7	29.3	14
itc1 Piedmont	**1 851**	**525.1**	**28.4**	**15**
cz02 Střední Cechy	565.7	160.3	28.3	16
pt11 Norte	1 805	510.9	28.3	17
itd5 Emilia-Romagna	1 91	538.5	28.1	18
sk04 Východné Slovensko	590.3	164.5	27.9	19
itd4 Friuli-Venezia Giulia	519.1	143.6	27.7	20

Source: Eurostat.

There has been a steady reduction in the contribution of manufacturing to the economic growth of the region, as indicated by the proportion of regional output derived from the manufacturing sector. Although manufacturing remains more important to Piedmont than to the Italian economy as a whole, its proportional decline over the last decade (23%) is far more than for Italy (17%). Currently, slightly less than one quarter of Piedmont's regional output comes from the manufacturing sector, compared to the Italian average of one-fifth.

Table 2.15. **The evolution of manufacturing's importance in overall GVA, Piedmont and Italy, 1995-2005**

	Italy	Piedmont
1995	25.0%	32.0%
1996	24.5%	31.4%
1997	24.4%	31.6%
1998	24.5%	31.9%
1999	23.8%	30.5%
2000	23.4%	29.9%
2001	22.8%	28.6%
2002	22.4%	27.8%
2003	21.4%	26.5%
2004	21.2%	25.1%
2005	20.6%	24.7%

Source: Finpiemonte Background Report (2007).

The ICT sector has emerged from manufacturing to a position of relative strength

In the Piedmont region, the ICT sector emerged as a significant economic entity during the 1980s, in the service of the manufacturing industry. At that point in time, ICTs were used by the metals, mechanics and electronics industries (including FIAT) on the one hand, and the mechanical and electronics based technology of Olivetti on the other. In the 1980s, there were increasing pressures towards and support for "outsourcing", assisting the creation of the CSI Piedmont (*Consorzio per il Sistema Informativo Piemontese*), established by the public sector to meet the needs of public markets for information systems.

This at once highlights the contradiction in the strength of the ICT industry. There was clearly a strong private ICT sector emerging from the traditional large manufacturing firms such as FIAT and Olivetti. However, this private sector was not playing a leading role in the establishment of the novel ICT sector. Consequently, it was left to the public to co-ordinate new firm creation and technology transfer initiatives seeking to consolidate these disparate activities into a genuinely regional sector.

The sector has been able to attract a number of leading global ICT firms as it has grown. Nevertheless, and in comparison with other regions which have built successful ICT clusters, these numbers remain relatively low. The result of this is that the sector is dominated by SMEs and micro-enterprises. Many of these firms are spin-offs from the Polytechnic rather than from the large multi-nationals located in the region.

According to data from the ICT Observatory of Piedmont, companies in the ICT sector constitute approximately 3.6% of the total Piedmont business registration. The title "ICT sector" is perhaps a misnomer because of widespread variations in their size, focus and innovation capacity. The majority of firms are in the service sector, providing professional services and software applications. The majority of these firms are located in Turin province (see Table 2.16).

Table 2.16. **Incidence and distribution of ICT enterprises in Piedmont (2003)**

	Region	Turin Province	Other provinces
% ICT firms in total business registration	3.55%	4.37%	2.63%
Share of ICT firms in manufacturing ICT	12.91%	11.66%	15.24%
Share of ICT firms in professional services	66.01%	66.78%	64.59%
Share of ICT firms in distribution/ commerce	12.09%	13.49%	9.48%
Share of ICT firms in content industries	8.98%	8.07%	10.69%

Source: ICT Observatory of Piedmont (*Osservatorio ICT Del Piemonte*) – Baseline (2005), *www.sistemapiemonte.it/osservatorioICT*.

Whilst progress towards a knowledge economy has been patchy..

Other sectors have fared better in Piedmont, although performance has been below the Italian average in the key business services sectors. In Piedmont, the share of employment in manufacturing lost in the last decade (around 5%) has been matched by a comparable growth in the business services sector. What the data does not show is the proportion of these jobs which have been knowledge intensive and high productivity. The strong growth of Rome and Milan as service centres for Italy as a whole suggests that Turin may also be evolving a second tier set of business support services.

Table 2.17. **The changing sectoral contributions to Piedmont's economic structure, GVA and employment, 1995-2005**

	GVA share		Employment share	
	1995	2005	1995	2005
Agriculture	2.7%	2.0%	4.1%	3.7%
Mining, manufacturing & utilities	32.0%	25.1%	31.6%	25.6%
Construction	5.0%	5.0%	5.8%	6.3%
Private services	22.3%	27.5%	10.9%	15.4%
Trade & repair	23.0%	23.3%	23.9%	24.1%
Public administration	15.1%	17.0%	23.7%	24.9%
	100.0%	100.0%	100.0%	100.0%

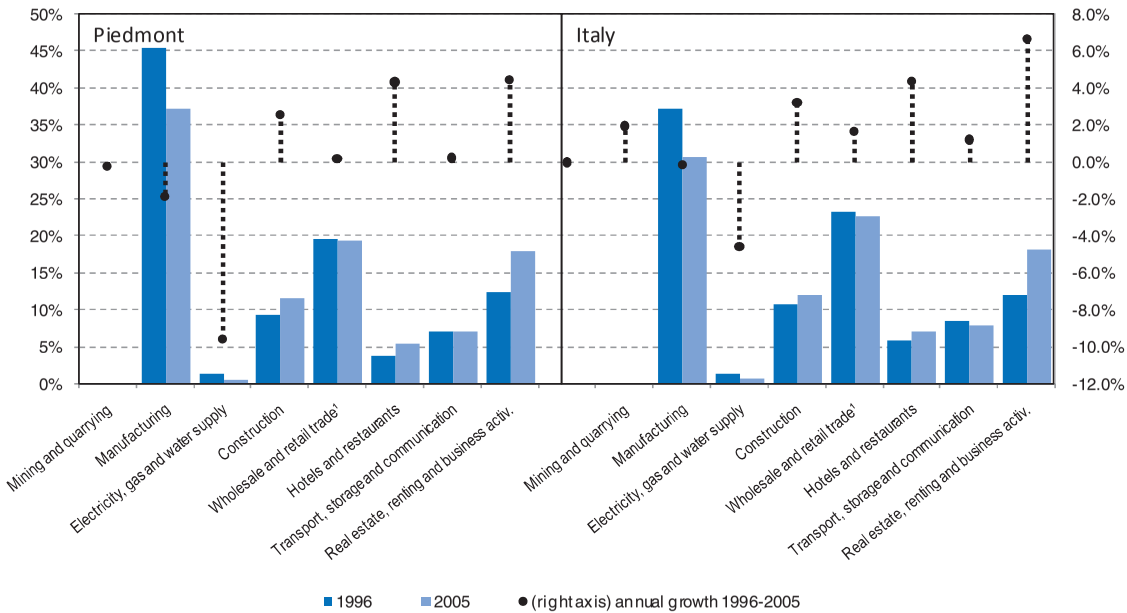
Source: Finpiemonte Background Report (2007).

Where Piedmont does have a strong knowledge intensive service base is in the field of knowledge intensive technical services (KITS), such as R&D, laboratory services and testing and architecture. The data does not indicate what the growth in KITS has been but it is likely that at least some of the manufacturing employment lost has been a re-badging of activities from manufacturing into KITS. In the last two decades, automotive and engineering sectors have hollowed out their activities and sought to sub-contract other activity. Some of these services are provided locally, and intra-firm location specialisation is now picked up better within datasets.

The final sector in which Piedmont has performed comparatively well has been the hotels and restaurants sector. Piedmont has a number of clear advantages in this sector, and although overall employment remains proportionally low, there are signs that it may perform well into the future. Concerted efforts have been placed into building the tourist sector, and ensuring that there is an infrastructure of amenities and destinations to capture increasing tourist expenditures. Event-based marketing is now an important phrase in the Piedmont lexicon, with the 2006 Winter Olympic Games the first in a series of annual events aiming to position Piedmont globally as a desirable tourist destination.

The region is the home of the "slow food" movement, which in turn emerged out of a tradition of local artisanal food production around Cuneo. Explicit recognition of the economic and symbolic value of this sector has led to a greater exploitation of this food cluster which accounts for 1 300 businesses in Cuneo. The small firm industrial district has been supported by a number of measures including the creation of a University of Gastronomy and an Agro-food Science Park within the Province. Cuneo has seen strong growth in its overall regional employment situation in recent years, growing 11% in the period 1999-2006.

Figure 2.9. **Sectoral composition and growth trends in Piedmont and Italy, 1996-2005**

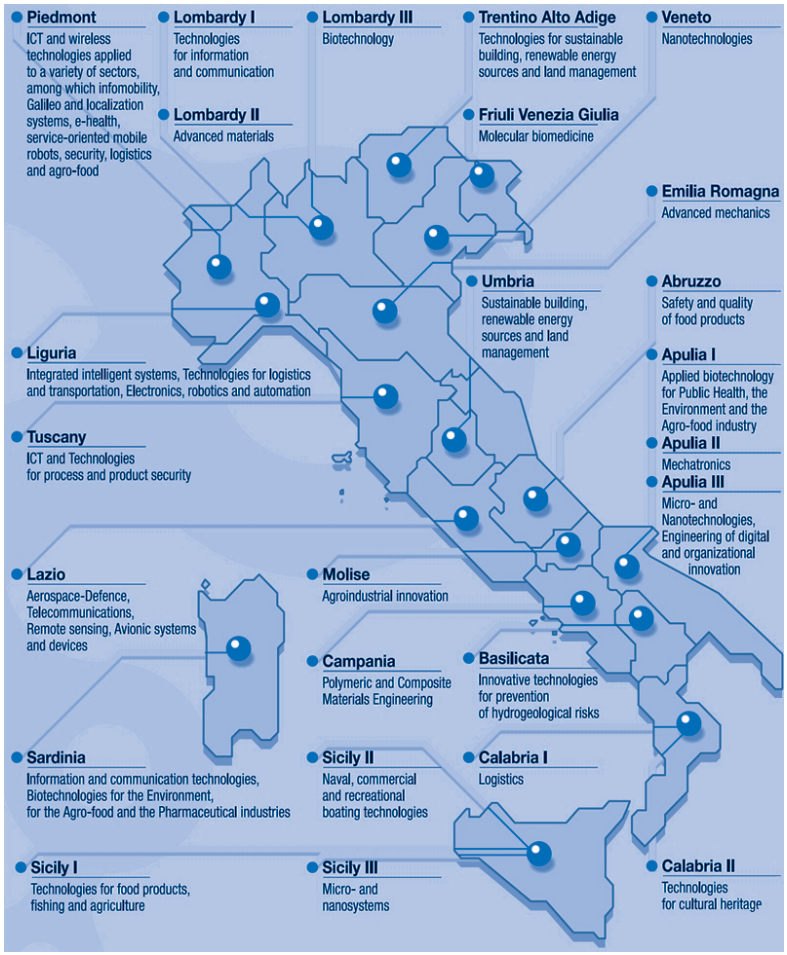


¹ Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods.

Source: OECD Regional Database.

In the Italian context, Piedmont is also host to one nationally designated high technology industrial district, the Torino Wireless Foundation. These 25 districts were nationally designated on the basis of fulfilment of three criteria, namely the presence of industry (including an SME network) a strong university and industrial research base, and a functioning governance system. These districts seek to support knowledge exchange between actors within these specialised innovation systems at the region level. As explained in Chapter 4, these districts are at different stages of development, some of them being currently active and others being in the start-up phase. All 25 districts are shown mapped to their host region in Figure 2.10.

Figure 2.10. **The technology districts of Italy, 2008**



Source: Torino Wireless Foundation (2008).

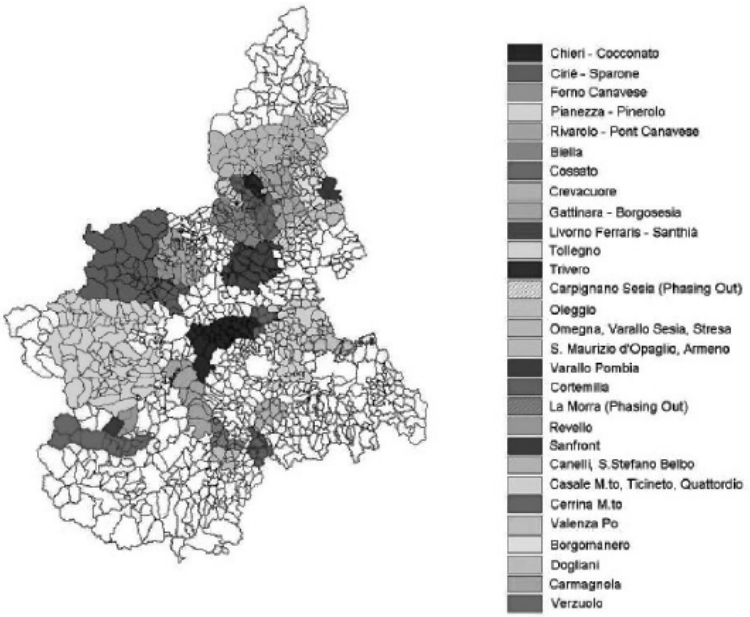
Piedmont is still influenced by its heavy industry economic history, and has fewer of the industrial districts which are regularly identified as being central to the "Italian exception" (high productivity growth along with comparatively low levels of human capital). Table 2.18 highlights those industrial districts identified and designated by the Italian statistical agency (IStat). The industrial districts are all in sectors traditionally associated with Piedmont, including textiles/clothing, mechanical engineering and food. Although large manufacturers have reduced their employment within Piedmont, small firms do remain an important component of the industrial base.

Table 2.18 **Industrial district in the region (Ires, 2004)**

Name	Sector	Number of municipalities in the district	Population
Chieril-Cocconato	Textile/ clothing	36	80 085
Cirie'-Sparone	Metalmechanics	45	113 033
Forno Canavese	Metalmechanics	10	19 020
Pianezza-Pinerolo	Metalmechanics	90	290 537
Rivarolo-Pont Canavese	Metalmechanics	32	63 683
Biella	Textile/ clothing	33	110 535
Cossato	Textile/ clothing	26	43 160
Crevacuore	Textile/ clothing	7	6 720
Gattinara-Borgosesia	Textile/ clothing	18	58 376
Livorno Ferraris-Santhia'	Metalmechanics	19	42 474
Tollegno	Textile/ clothing	11	13 268
Trivero	Textile/ clothing	4	12 113
Carpignano Sesia	Phased out		11 008
Oleggio	Textile/ clothing	7	26 881
Omegna-Varallo Sesia-Stresa	Metalmechanics	41	59 328
S.Maurizio d'Opaglio-Armeno	Metalmechanics	10	12 680
Varallo Pombia	Metalmechanics	6	20 293
	Textile/ clothing		
Cortemilia	Textile/ clothing	9	5 083
	Food		
La Morra	Phased out		9 401
Revello	Textile/ clothing	3	6 680
Sanfront	Textile/ clothing	3	4 028
	Wood		
Canelli-Santo Stefano B	Food	13	22 645
Casale-Ticineto-Quattordio	Metalmechanics	50	91 704
Cerrina	Metalmechanics	8	5 612
	Wood		
Valenza	Goldsmith	10	33 025
Borgomanero	Metalmechanics	29	83 525
Dogliani	Paper and printing	8	9 061
	Wood		
Carmagnola	Metalmechanics	10	87 207
Verzuolo	Wood	14	18 335
Total		**543**	**1 354 417**

Source: www.regione.piemonte.it/industria.

Figure 2.11. **The location of the traditional industrial districts of Piedmont**



Source: Finpiemonte Background Report (2008).

Piedmont is developing new high-technology manufacturing sectors

Piedmont's industrial base has undergone significant restructuring for two decades, but remains strongly focused towards high-technology industrial sectors. Classifying industrial sectors according to their technological level highlights that much of the manufacturing which remains in the region is high or medium technology. As Table 2.19 shows, although there has been a reduction of around 80 000 jobs in manufacturing within the region, the proportion of those in the high and medium technology sectors has remained relatively constant at 45%.

Table 2.19. **Changing employment levels in Piedmont's manufacturing and high/ medium technology sectors, 1995-2005**

Year	Manufacturing	High/ medium	%
1995	597 631	266 870	44.7
1996	589 066	253 875	43.1
1997	557 163	246 382	44.2
1998	548 307	233 624	42.6
1999	559 713	240 809	43.0
2000	559 480	245 607	43.9
2001	544 805	244 316	44.8
2002	532 808	235 094	44.1
2003	519 967	231 459	44.5
2004	524 532	216 420	41.3
2005	512 213	225 787	44.1
2006	508 916	226 338	44.5

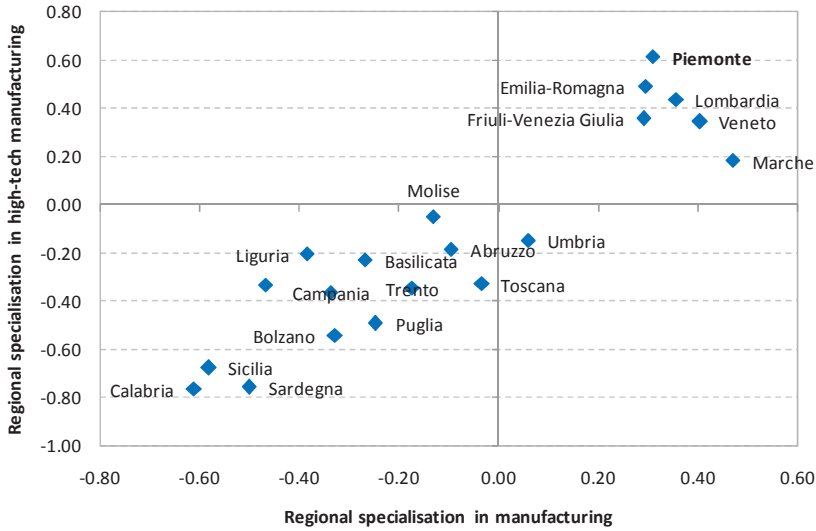
Source: Finpiemonte Background Report (2007).

It is not the case that restructuring has seen a substitution of low technology jobs by high technology jobs, but it is important to qualify these figures as being based on sectors of employment rather than the skill level of the individual.

Taking the wider Italian context shows that whilst Piedmont is not the most specialised in manufacturing (trailing Marche, Veneto and Lombardy), it is the most specialised in high technology manufacturing. The chart in Figure 2.12 shows the performance of the Italian regions, and highlights that the "First Italy" is both the centre of Italian manufacturing as a whole, but also of its high technology manufacturing. Southern regions are more strongly dependent on agriculture which has not provided the industrial base for the development of new high technology industries.

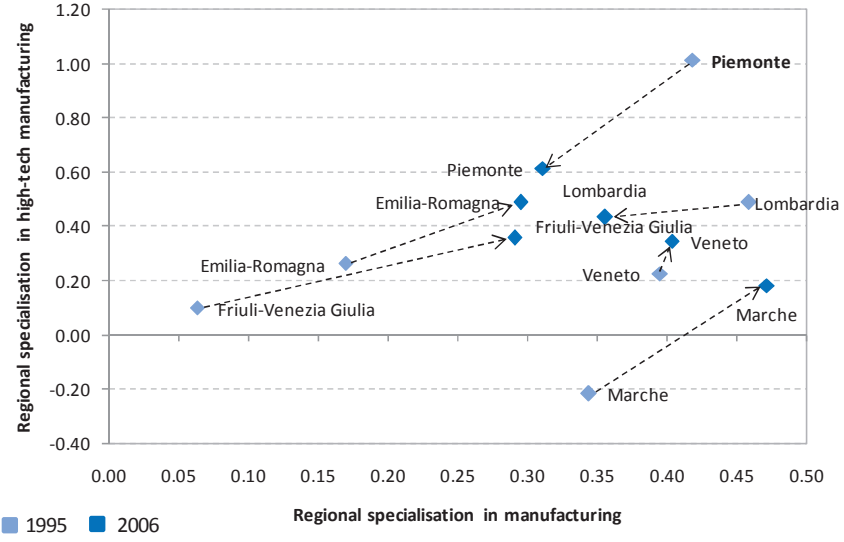
More worryingly for Piedmont is the long-term trend underlying this current performance. As with overall economic performance, there has been a convergence of Piedmont towards the Italian average away from a position of overall strength. Figure 2.13 shows that in 1995, Piedmont's high technology specialisation index was +1, with Lombardy the nearest at +0.45, By 2006, Piedmont's high technology specialisation had fallen to +0.6 (a net fall of -0.4), whilst Veneto, Friuli-Venezia Giulia, Emilia-Romagna and Marche had all registered net gains of +0.2 over the same period.

Figure 2.12. **Specialisation by technology level of manufacturing**



Source: OECD Regional Database.

Figure 2.13. **Evolution in technological specialisation, 1995-2006**



Source: OECD Regional Database.

Sub-regional production system

The relative economic decline of Piedmont reflects the fortunes of its main manufacturers and their tendency to delocalise their production activities, undermining the industrial districts and supply chains which have hitherto driven economic success. This decline has not occurred evenly across the region – as the industrial capital, the city of Turin, and its manufacturing suburbs, has been hardest hit by the decline of FIAT. Turin has also suffered from counter-urbanisation trends seen across advanced economies in the last two decades with a falling population seeking to avoid the problems of urban living. But there have been other areas which have been more successful. In particular, Cuneo, to the south of Turin, is emerging as a second growth pole for the region.

The Piedmont region is dominated by Turin

Piedmont can be divided into four "natural" sub-regions, Turin metro area, Cuneo, the Vercelli-Alessandria axis and the northern lakes. The natural capital of the region is the Turin metro area, which is home to around 2.4 million of the regions 4.2 million people, a population which has been relatively stable in the period 1992-2006. Cuneo is the region's emerging growth pole, relatively close to Turin but outside its urban sphere of influence, with its own industrial districts and a growing specialisation in artisanal food production. The axis running from Vercelli-Alessandria in the east of the region is the secondary economic zone in the region – although located between Milan and Liguria, its economic performance has been more peripheral than this strategic position might suggest. The northern lakes are a remote rural area, with much in common with similar regions elsewhere – increasing tourism activity has not provided the area with a strong, knowledge intensive and high-productivity regional industrial base.

Tables 2.20 and 2.21 show the relative distribution of population and employment in the provinces of Piedmont (whose boundaries do not perfectly coincide with the natural sub regions outlined above). Turin remains central to the region as a centre of population and employment opportunities. The provinces of Novara, Cuneo and Asti have all experienced growth in the last fifteen years of both their population and labour markets. Alessandria has grown more slowly but is a significant centre of both population and labour.

Table 2.20. **The sub-regional population distribution in the Piedmont region, 1992-2006**

	1992		2006		
Province	Pop (m)	%	Pop (m)	%	Change 92-06
Torino	2.188	51.6	2.243	51.6	2.5
Vercelli	0.179	4.2	0.177	4.1	-1.1
Biella	0.188	4.4	0.188	4.3	-0.3
Verbano-Cusio-Ossola	0.160	3.8	0.162	3.7	1.0
Novara	0.338	8.0	0.355	8.2	5.2
Cuneo	0.551	13.0	0.572	13.2	3.7
Asti	0.208	4.9	0.214	4.9	3.2
Alessandria	0.426	10.0	0.431	9.9	1.2
Piedmont Region	**4.241**	**100.0**	**4.344**	**100.0**	**2.4**

Source: OECD Regional Database.

Table 2.21. **Sub-regional labour force in Piedmont, 1999-2006**

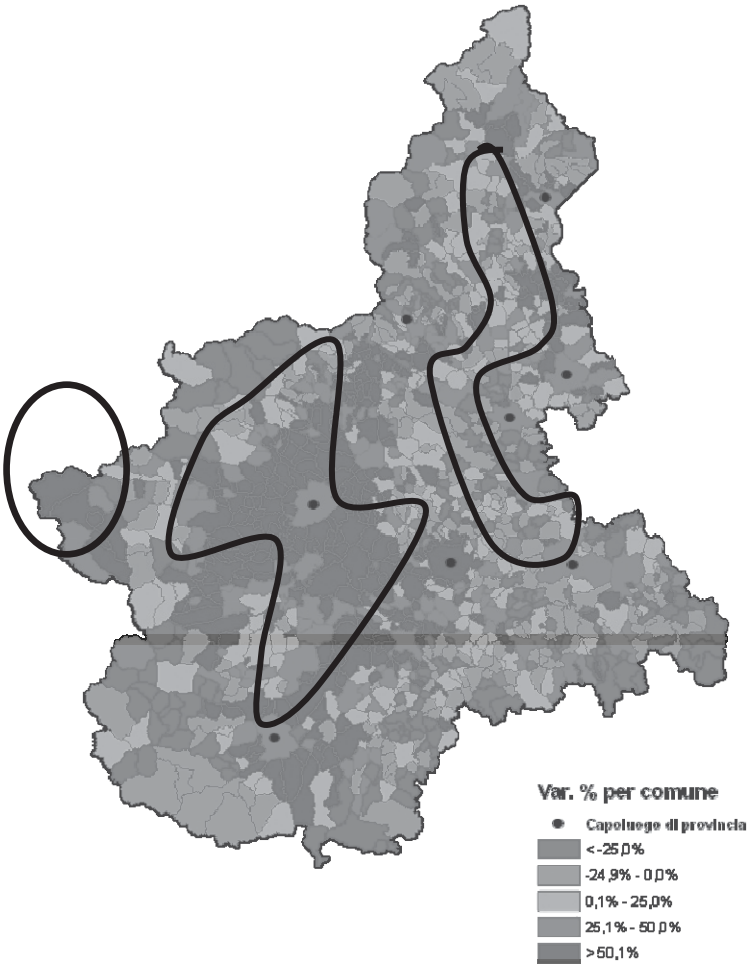
Province	1999	2006	Change	1999	2006	Shiftshare
Torino	982 700	989 066	0.6%	52.9%	51.3%	-3.0%
Vercelli	77 200	76 806	-0.5%	4.2%	4.0%	-4.1%
Biella	83 200	83 846	0.8%	4.5%	4.3%	-2.9%
Verbano-Cusio-Ossola	68 200	71 480	4.8%	3.7%	3.7%	1.0%
Novara	154 400	164 037	6.2%	8.3%	8.5%	2.4%
Cuneo	239 700	266 753	11.3%	12.9%	13.8%	7.2%
Asti	90 300	92 451	2.4%	4.9%	4.8%	-1.3%
Alessandria	163 500	184 803	13.0%	8.8%	9.6%	8.9%
Piedmont	**1 859 200**	**1 929 242**	**3.8%**	100.0%	100.0%	0.0%

Source: OECD Regional Database.

Turin and Cuneo are hotspots in a tepid economy

This situation is mirrored in the provincial contribution to the regional economy. Turin accounts for over one half of output (as well as population and employment), and remains economically buoyant. Outside Turin, Cuneo's success is evident, with the highest output of any of the provinces, along with consistent growth in the last decade. Verbano-Cusio-Ossola is still significantly lagging with respect to the regional economy, a situation exacerbated by below average regional growth rates.

Figure 2.14. **The changing numbers of companies in Piedmont by municipality 1971-2005**

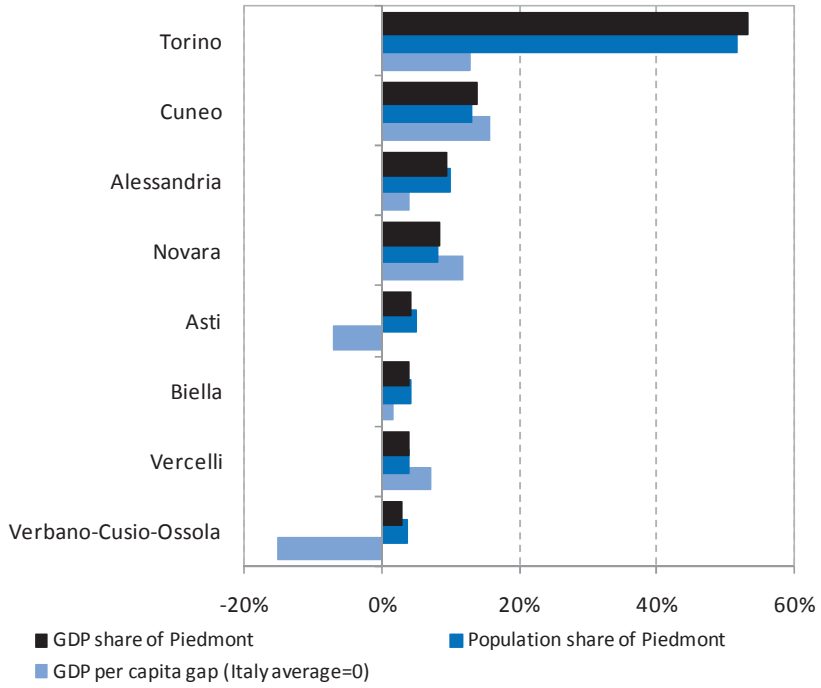


Source: Calculations by *Unioncamere Piemonte* on Istat data.

Table 2.22. **Sub-regional contributions to Piedmont's economic base**

	GDP 95	GDP 05	pa Growth	GDP index	GDP Share
Torino	19 185	23 837	2.2%	103	53.8%
Vercelli	17 702	22 635	2.5%	98	4.1%
Biella	18 150	21 496	1.7%	93	4.4%
Verbano-Cusio-Ossola	15 156	17 942	1.7%	78	3.1%
Novara	18 387	23 630	2.5%	102	7.8%
Cuneo	19 413	24 465	2.3%	106	13.5%
Asti	15 727	19 663	2.3%	85	4.1%
Alessandria	17 068	21 972	2.6%	95	9.3%
Piedmont	**18 509**	**23 141**	**2.3%**	**100**	**100.0%**

Figure 2.15. **The sub-regional economy of Piedmont2005**



Source: OECD Regional Database.

Prospects for Innovation-driven growth

In the last two decades, Piedmont has declined in a gradual way which has avoided demands for strong ameliorative action. On a number of important indicators, such as output per capita and concentration of high technology industries, the region has converged with the Italian average at a time when Italy's overall national performance has been modest. Since the late 1980s, there have been concerted political efforts to revitalise the Piedmont region and its industrial base. Starting in Turin in the 1990s, there have been efforts to attract new high technology industries and strengthen indigenous firms' innovation capacities. There is a strong and innovative industrial base which could help to restore momentum to the region's economic development trajectory. However, the impacts of these efforts have not yet had sufficient time to feed through into Piedmont's performance.

Piedmont is the industrial research core for Italy

Piedmont is one of the least exceptional of the Italian regions as far as industrial R&D is concerned. The region's leading large companies have tended to adopt their competitors' practices, not least industrial R&D. Whilst Italy traditionally does not invest much in R&D, Piedmont has long bucked this trend. Piedmont's gross investment in R&D as a proportion of GDP is the second highest of all Italian regions, trailing only Lazio. Lazio is an exceptional region because, as the country's capital, it is home to a large number of government R&D activities which contribute around half of total R&D expenditures. This concentration of government R&D in a single region is quite exceptional even in the OECD context.

What makes Piedmont's performance exceptional in this regard is the fact that almost all the expenditure is carried out in the private sector. Indeed, its figure for private R&D expenditure is higher than total expenditure in every other region except Lazio. This figure is all the more surprising given the sectoral make-up of this region's industrial base as being concentrated in medium technology engineering activities where R&D expenditure can be difficult to effectively measure.

Table 2.23. **Business expenditure in R&D in GERD, 2004, selected EU regions**

Region	BERD in GERD (%)
Bayern	80.20%
Baden Wurttenberg	79.30%
Piedmont	**78.60%**
Lombardy	73.20%
Stockholm	70.80%
Ile de France	69.10%
Etela-Suomi	68.50%
Rhone-Alpes	68.20%
Emilia Romagna	59.40%
Wien	58.00%
Comun. de Madrid	56.60%
Tuscany	31.20%
Lazio	24.40%

Source: European Commission, Regional Innovation Scoreboard (2007).

Tables 2.24 and 2.25 show that over the last decade, Piedmont has been an exceptional performer in an Italian context in terms of its expenditure on GDP.

Table 2.24. **Sectoral R&D expenditures for business, government, higher education and non-profit, as % GDP, 1995, top five and bottom five Italian regions**

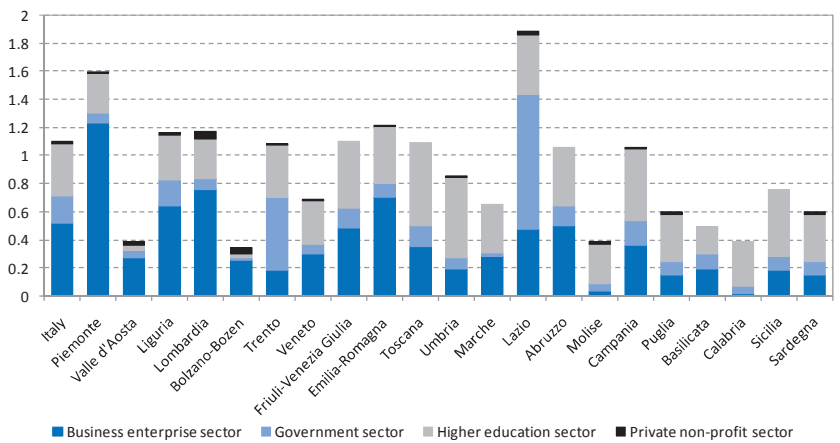
	Sectoral R&D Expenditures, 1995				
	BERD	GOVRD	HERD	PNPRD	TOTAL
Lazio	0.67	0.89	0.35	.	1.91
Piedmont	**1.54**	**0.09**	**0.14**	**.**	**1.77**
Lombardy	0.97	0.13	0.14	.	1.24
Liguria	0.56	0.30	0.31	.	1.17
Friuli-Venezia Giulia	0.69	0.19	0.28	.	1.16
Puglia	0.18	0.09	0.22	.	0.49
Marche	0.13	0.05	0.25	.	0.43
Calabria	0.02	0.05	0.21	.	0.28
Molise	0.00	0.02	0.15	.	0.17
Valle D'Aosta	0.06	0.01	.	.	0.07

Source: OECD Regional Database.

Table 2.25. **Sectoral R&D expenditures for business, government, higher education and non-profit, as % GDP, 2005, top five and bottom five Italian regions**

Sectoral R&D Expenditures, 2005					
	BERD	GOVRD	HERD	PNPRD	TOTAL
Lazio	0.47	0.96	0.43	0.02	1.88
Piedmont	1.24	0.07	0.28	0.01	1.60
Emilia-Romagna	0.70	0.10	0.40	0.01	1.21
Lombardy	0.76	0.08	0.28	0.05	1.17
Liguria	0.64	0.19	0.32	0.01	1.16
Basilicata	0.20	0.10	0.20	0.00	0.50
Valle d'Aosta	0.27	0.06	0.03	0.03	0.39
Molise	0.04	0.05	0.28	0.02	0.39
Calabria	0.02	0.05	0.32	0.00	0.39
Bolzano-Bozen	0.26	0.01	0.03	0.04	0.34

Figure 2.16. **Expenditure on research and development (R&D) as proportion of regional GDP, 2005**



Source: OECD Regional Database.

But performance has slid in recent years

In the last decade, however, there has been a slight slippage in R&D performance in Piedmont with GERD in GDP falling from 1.77% to 1.60%, with much of the fall accounted for in the private sector. There has been a strong increase in R&D recorded in the university sector whilst BERD in GDP has fallen by 0.3 percentage points. Piedmont's performance, whilst strong in an Italian context, is weak by international comparison. The majority of leading advanced economic regions have a GERD in GDP figure of 2.5% to 3.5%, whilst the Lisbon Agenda in Europe sets a target for every European region to invest 3% of its GDP in R&D by the year 2010. Table 2.26 highlights how far Piedmont lags behind other leading European manufacturing centres.

Table 2.26. **GERD in GDP, selected European comparison regions, 2004**

Region	GERD in GDP
Stockholm	4.31%
Baden Wurttenberg	3.88%
Etela-Suomi	3.51%
Wien	3.33%
Ile de France	3.11%
Bayern	2.95%
Rhone-Alpes	2.57%
Lazio	1.73%
Piedmont	1.64%
Comun. de Madrid	1.64%
Emilia Romagna	1.14%
Tuscany	1.11%
Lombardy	1.06%

Source: European Commission, Regional Innovation Scoreboard (2007).

R&D inputs are not the same as innovation outputs

Increasing labour productivity per hour worked in the context of an ageing population is the major macro challenge for Piedmont in the coming decade. The high levels of R&D reported in the region are an important foundation for regional economic success. But productivity growth will only tangentially be driven by R&D activity itself (through the salaries of those employed in the sector). Productivity growth hinges on the capacity of the region to absorb the benefits of those R&D investments, which in turn is

dependent on two other variables. The first is the extent to which the innovations developed within corporate R&D are implemented within regional businesses to create economic growth. The second is the capacity of the regional labour market to support that business growth, and in particular, the necessary high-level skills to support innovative business growth.

Piedmont performs well in this regard, and there are high levels of reported innovation rates in the Community Innovation Survey and the local Chamber of Commerce industry survey. The region has a large number of firms declaring that they are engaged in some kind of innovative activity. Table 2.27 shows the percentage of firms report innovative activity, segmented by the kind of innovation activity. The report from which this data is drawn suggests that the two key barriers to more firms becoming innovative is their relatively small size, and poor managerial capacity in those businesses.

Table 2.27. **Regions, firms and innovation activity (%), by type of innovation**

Region	Firms	Innovation activity (%)			
	%	product	process	organisation	marketing
Emilia-Romagna	20.7	50.7	15.3	28.4	34.2
Lazio	18.8	40.0	16.2	39.0	39.7
Tuscany	18.8	64.2	14.6	30.3	36.3
Piedmont	**17.6**	**39.9**	**25.9**	**23.4**	**37.8**
Lombardy	15.9	43.7	25.0	25.1	20.0

Source: European Commission, Regional Innovation Scoreboard (2007).

Regional Chamber of Commerce data suggests that R&D activity in Piedmont is highly concentrated, both sectorally, with half the region's electrical engineering reporting innovation, and amongst large firms (half report innovation). This suggests a picture of four highly innovative industrial sectors driving innovation through the supply chain and amongst regional SMEs. Alongside the electrical engineering sector, the other three dominant innovation sectors in the region are automotives, ICT and the pharmaceutical industry. This sectoral distribution of innovation activity is shown in Table 2.28.

Table 2.28. **Sectoral distribution of regional firms (%) declaring innovation, 2005**

Sector	%
Vehicles & parts	26,5%
ICT	20,4%
Pharmaceuticals	16,3%
Industrial manufacturing	14,3%
Electronics	8,2%
Consumer products manufacturers	6,1%
Metals & mining	4,1%
Aerospace & defence	2,0%
Utilities	2,0%

Source: European Commission, Regional Innovation Scoreboard (2007).

Further evidence of weakness in Piedmont's innovation system is the relatively low patenting rates in the region. Patents are an intermediary activity as a knowledge investment – they result after investment in R&D and seek to protect ideas that companies regard as potentially valuable. However, they are not a direct output, but a proxy for future innovation performance. Table 2.29 shows the patent performance of a number of European regions, controlling for regional output (GDP). This highlights the fact that Piedmont has much less patenting activity than comparable regions elsewhere in Europe.

Table 2.29. **European patent applications, 2003, per unit of regional output**

Region	Patents/ GDP
Baden Wurttenberg	30.71
Bayern	22.49
Etela-Suomi	17.1
Rhone-Alpes	14.74
Stockholm	14.59
Ile de France	11.06
Emilia Romagna	10.48
Lombardy	8.7
Piedmont	**8.32**
Wien	7.99
Tuscany	4.78
Lazio	2.57
Comun. de Madrid	2.34

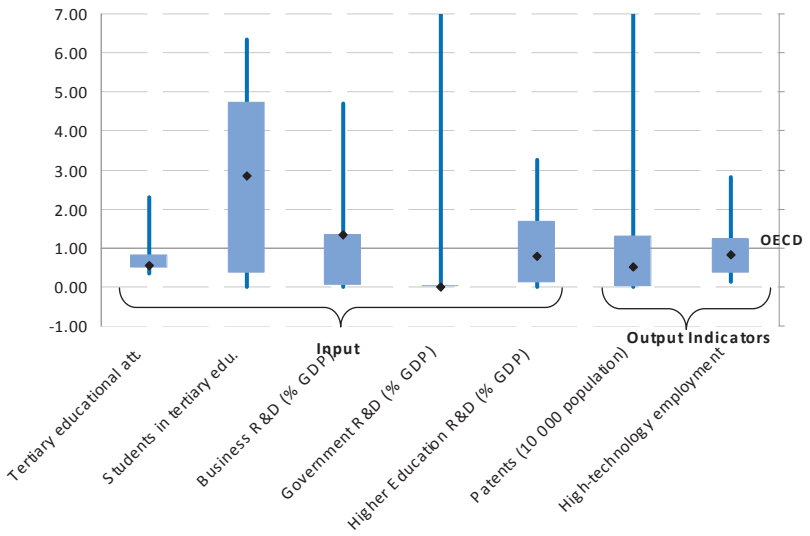
Source: European Commission, Regional Innovation Scoreboard (2007).

Piedmont's innovation performance lags its world-class aspirations

Piedmont's innovation performance has both positive and negative dimensions. The region has a high level of business R&D, there are many innovative businesses and there are buoyant industrial districts. Cuneo is growing strongly on the back of its high value-added agro food sector, and the Turin metropolitan core area continues to perform strongly economically. However, there are weaknesses, notably the very low level of human capital in Piedmont's labour market, and weak investment in non-private R&D sectors (with an almost total absence of government and non-profit R&D).

Figure 2.17 decomposes Piedmont's innovation performance into variables capturing inputs and investments in R&D as well as outputs in terms of innovation and patents. The figure depicts the region as performing slightly weakly against OECD and Italian comparators. The scoreboard does include a number of variables which are not directly within the control of the region, and which evolve only slowly in response to national level decisions. Although Piedmont has a strong claim for greater government investment in R&D on the basis of its competencies in business and higher education R&D, Lazio has an entrenched advantage in this area. NFP R&D expenditure is only a relatively small share of the overall mix.

Figure 2.17. **Piedmont's investment and performance in high-technology sectors in Italian (bar) and OECD (line) comparison**



Source: OECD Regional Database.

This figure suggests some of the levers that policy makers in Piedmont have to address in order to improve innovation performance and boost growth. Disregarding those variables which cannot be influenced at the regional scale, such as government R&D expenditure and high technology employment, the scorecard suggests that the main challenges for the region are to:

- Increase the educational levels of the workforce, particularly in graduate-level positions, improving retention of the large numbers of students in the region.
- Ensure that new jobs are created in the most innovative businesses who are effectively using the human capital resources of their employees.
- Improve innovation in micro-businesses where appropriate, and provide micro business managers with the skills to grow through innovation.

The regional response to these challenges

Piedmont faces the challenge of dealing with this industrial restructuring, whilst attempting to build new high technology and high employment sectors. But policy makers have not found it simple to promote innovative activities in Piedmont. There are already many businesses which are active in innovation, as demonstrated by the region's extremely high levels of business R&D. There is also a very strong complementary research base within Piedmont's universities and public research laboratories.

But, what is missing appears to be collaboration and interaction between these various sectors to create absorptive capacity to ensure that Piedmont's discoveries benefit its population. There is negligible exchange of personnel between universities, research laboratories and the private sector. Traditional indicators of innovative activity such as high technology entrepreneurship, patenting, R&D expenditure are low in international terms (although relatively high in an Italian context). Since the mid-1990s, there has been a concerted effort by policy makers to address these problems and to reverse this weak innovation performance to restore momentum to Piedmont's industrial trajectory.

In the 1990s and early 2000s, the region used EU Structural Funds to directly invest in innovative activities to encourage co-operation between firms, universities and other regional actors. A significant amount of financial support flowed into a very wide range of activities, including a number of pilot innovation and collaborative partnerships between firms, universities and research centres. One of the main stumbling blocks limiting the effectiveness of this innovation was a lack of co-operation between

partners, and there was very little flow of staff between the sectors which might form the basis for increased co-operation.

These partnerships are important because the Piedmont region simply does not have the resources to directly fund enough business innovation within the region to materially change this situation. Local political authorities have therefore turned to see whether they can change their policy focus from directly funding innovation, to encouraging better co-operation between partners. There has been a shift in emphasis from funding good innovative ideas, to funding good innovative ideas that require partnership activity for success.

The intention behind this change is quite explicit: funding on innovation projects should make significant resources (knowledge, venture finance, skilled personnel) available to the region's innovative businesses. On the one hand, they are attempting a paradigm shift, from a haphazard, organic support for existing activities towards a more programmatic and systemic approach. On the other hand, they are trying to encourage a system evolution, so that successful pilot partnerships drive a wider regional learning process, that build a culture of innovation across Piedmont's public, private and third sectors.

Piedmont faces a difficult balancing act, on a variety of important dimensions. It seeks to encourage new industries without neglecting its highly successful industrial base. The regional government is attempting to impose more control and systemic behaviour on actors, but must avoid crushing the very successful pilot activities which have emerged in the last decade. The regional government does have constitutional responsibility for innovation policy, but not for the science base which is funded by the Italian Ministry for Universities and Research.

In short, Piedmont currently faces a number of important challenges that are common across advanced economies:

- How can policy makers steer the regional economy towards innovative new industrial sectors without neglecting the future growth potential of their main industrial base?
- How can a balance be struck between investing in excellence, and creating sub regions cut off from the mainstream of the competitive knowledge economy?
- How can regions escape the constraints of their national systems and create the necessary assets and capital investment to ensure their future success?

This Innovation Review seeks to understand the choices taken within the region and how they have created a response to those challenges. The lessons which can be learned from this case have a much wider salience than just the Piedmont region alone. Piedmont is a region which has been struggling to maintain its economic success and its successes and failures provide very useful insights into the wider challenges of regional innovation policy.

Chapter 3

The Piedmont Regional Innovation Strategy

Introduction

The region of Piedmont – and its innovation system – was once dominated by dense corporate production chains in automotive production (FIAT), chemicals, ICT (Olivetti) and precision engineering. Since the 1970s, these sectors have entered a period of secular decline. However, regional actors were initially reluctant to acknowledge the fundamental nature of the changes taking place, and in particular, to embrace a shift from supporting industry into creating supportive environments for innovation. Therefore, many policy activities developed elements of an innovation policy, but in a very unco-ordinated way.

Piedmont has made serious attempts since the 1990s to revitalise its declining regional economy by upgrading its production system, shifting existing industries and sectors upwards in global value chains and trying to encourage the emergence of new, high-technology, high value-added activities. From the mid-1990s, the availability of the European Structural Funds provided the regional government with the resources to begin to tackle the innovation agenda seriously. The government funded a large number of experimental projects proposed by a range of different actors and partnerships.

This had the effect of helping to create a very fertile and creative set of regional innovation activities. But the weakness in this approach started to become evident from the turn of the century. In the period 2000-06, Structural Funds were spent in a similar manner, funding a haphazard set of experiments with no one guiding principle. They were robustly criticised for failing to learn from the past experiments and use collective territorial learning to improve the selection and funding of projects.

This was the context against which a new President arrived at the head of a new regional government, following Italy's April 2005 regional elections. The winning party in Piedmont had made much of campaigning on a platform of using innovation as a means of renewing and reforming public services in the region. The idea of innovation figured as a central plank of their platform for government.

The incoming government took an early series of decisions to implement these commitments, including reforming the regional development agency Finpiemonte, but also and critically passing a new Regional Law on regional innovation. Since the change of government in Piedmont in 2005, the new regional government has made significant reforms to the way that innovation policy is delivered. The centrepiece of these reforms is a new Regional Law (04/2006) which mandates the region to produce a Research Plan, and establishes a number of executive, oversight and stakeholder committees to support the development of that plan. These reforms have attempted to address what were perceived as the contemporaneous weaknesses of the Piedmont Regional Innovation System, notably the lack of strong political control over policy decisions in parallel with a highly fragmented and confusing support system.

Understanding the impacts of the new law on the existing innovation actors is therefore a central element of the task of reviewing Piedmont's approach to innovation. On the one hand, the Regional Government is intending to use the Law to help make evaluation, monitoring and rationality central to a new regional innovation culture. On the other hand, there is the risk of disrupting and even destroying effective existing innovation support activities which are not deemed to fit with this new paradigm. Both the legislative framework and the implementation of this new Regional Law will define the impacts that it has in terms of creating a sense of cohesion and hierarchy to a very diffuse regional innovation system.

This chapter sets out the nature of post-2005 legislation and policy making as the basis to understand what has been done in Piedmont to address the challenges highlighted in the preceding chapter. The chapter then turns to look at how these laws and administrative changes fitted with the problems and challenges facing the region. The following section considers the wider congruence between the post-2005 situation and the longer-term evolution of Piedmont's regional innovation system. The chapter concludes by highlighting where there appear to be uncertainties or problems with this congruence. This set of uncertainties and problems forms the basis for a list of key questions for a more detailed exploration of the relevance of the actions undertaken against the regional context which is addressed in the two subsequent chapters of this report.

The key dimensions of the post-2005 reforms

Exploiting the benefits of recent constitutional revisions

The Italian regions have historically been very weak constructs. However, since the 1990s they have gained significant competencies, although according to a variably geometry with much greater devolution to the special administrative regions (Sicily, Sardinia, Valle d'Aosta, Friuli-Venezia Giulia and autonomous Provinces of Trento and Bolzano).

The first step, in this respect, has been the legislative Decree No. 112 of 31 March 1998 which gave specific powers to the regions over the design and implementation of industrial and technological policies. In particular, this decree made the regions responsible for overseeing the implementation of national policies and funding streams in the regions. The national government reserved a number of powers at this time, including the right to define strategies and implementation guidelines nationally, and to retain the exclusive competence for research support. However the supply of public funding and the supervision on the local conditions for the application of the national policies have been delegated to the regions.

Further major changes occurred with the Constitutional Law No. 3 of 2001, which expands the powers and autonomy of the regions, by defining all competencies to either the state or regional level, or as co-competencies, with a presumption that all non-reserved powers belong to the regions. There were two important articles that suddenly made serious regional innovation policies possible in Italy, by devolving both the competencies for innovation as well as the resources to implement those competencies, articles 117 and 119.

- *Article 117* – The state has exclusive competence in university research, national research institutes and academies, strategic infrastructure, pre-competitive industrial R&D and development programmes for industrial sectors, Italian-European scientific infrastructure and IP protection. Co-competence was defined as education, science and technology;[1] research and support for manufacturing R&D. Reserved to the regions are all territorial development functions, including SME innovation, technology transfer, and research mobility.

- *Article 119* – The principle of financial autonomy is established: lower levels of government may levy taxation and revenues in accordance with the Constitution and the national public finance and tax system. Sub national governments must be fully and suitably recompensed for the additionally decentralised spending functions.

Thus, although the devolved powers were in theory exercisable since the late 1990s, it was only with the constitutional change of 2001 that a serious attempt to engender regional innovation policy was possible, because it was the only way, at that point, in which regions had the resources necessary to implement their new responsibilities. The regional governments elected in 2005 were the first governments which had the opportunity to use these new powers along with the necessary resources. It is only since 2005 that regional governments have been elected in Italy with the powers, the resources and the electoral mandate to move seriously into creating a regional innovation policy. There was only one regional government in the period 2002-05 (Campania) which used these powers immediately to create an innovation strategy

There has been quite a variety of outcomes in the Italian regions in terms of their approach taken to regional innovation policy. Using the framework above (legal basis, executive institutions, funding streams and strategies, and main investments), Table 3.1 compares what has happened in four other regions deemed to have the most in common with Piedmont in this context (Piccaluga & Primicerio, 2005). These changes reflect this general trend within the Italian regions towards a diversity of outcomes exploiting and experimenting with these new regional powers.

With this regulatory framework, the division of competencies and the mutual collaboration between the national and regional governments are accomplished case by case. Therefore, the devolution process in the field of innovation policy, amongst other things, has affected the Italian regions in different ways. Campania, as noted above, introduced a Regional Law on research policy as early as 2002, and is now approaching the end of its second 3-year Research Plan. Emilia-Romagna, with a long tradition of pragmatic co-operative industrial policy, was an early adopter of innovation policy within European structural fund programmes. Lazio has established a wide-ranging regional development agency that invests in high technology businesses as well as more traditional functions including inward investment promotion. Lombardy moved relatively late into Regional Research Planning, passing a law in 2007 to promote industrial competitiveness.

According to a recent study on regional policies for innovation in Italy (Piccaluga & Primicerio, 2005) the differences have arisen due to a number of reasons:

- **Asymmetrical devolution**: there is multi-speed devolution within Italy, with 15 regions having devolution according to an ordinary statute, and the remaining 5 a special statute assuring a higher level of autonomy with respect to national laws.

- **Funding levels**: there are differences in the available levels of funding for innovation policies as well as different levels of general public expenditure.
- **Entrepreneurial cultures**: different industrial and entrepreneurial traditions which lead to quite different choices around the kinds of industrial and innovation policies appropriate to particular regions.
- **Institutional capacity**: variable capacity in terms of programming and strategic development, reflecting the wide competencies these regions have to prioritise and create strategic coalitions within national European programmes.
- **Lead innovation actors**: regional differences in the types of actors involved in regional strategic development, in particular the traditional involvement of universities and research centres, and their willingness to participate in regional plans and actions.

The main findings on the governance model of the regional system of innovation for four key regions most similar to Piedmont are summarised in the Table 3.1. Each regional system is analysed in terms of four perspectives:

- Regional Ministry/Delegation to other ministries: the regional authority has created a specific regional ministry in charge of R&D and innovation policies or has delegated the legislative power on the subject to existing ministries.
- Specialised body/agency dealing with innovation: there is, or not, as the case may be, a specialised agency in charge of R&D and innovation promotion and support which collaborates with the regional authorities for the implementation of regional policy.
- Regional policies for research and innovation (laws and policy documents): the regional government has introduced, or not, a specific law on R&D and innovation and which are the main policy measures recently implemented (after the devolution process took place).
- Regional funds for risk capital: there is, or not, a regional financial company that disburses funds (private or regional funds) and/or participates in companies' capital and/or handles the region's financial instruments.

Table 3.1. **Progress in establishing regional research policies in Italy, 2001**

	Regional Ministry/ Delegation to other Ministries	Specialised body/agency dealing with innovation	Regional policies for research and innovation (laws and policy measures)	Regional funds for risk capital
Campania	In 2005 the Ministry of Innovation policy as well as the Education and Research Ministry have been integrated as the "Ministry for University and Scientific Research, Technological Innovation and New Economy, Information Systems and Statistics".	There is no specific regional body, but there is a network of regional centres of competence (CRC) supporting public administrations in spreading new technologies at local level.	RL 5/2002 regulates the promotion of Scientific Research. This established three year plans for Scientific Research (2002-2004 and 2005-2007. There is also a regional strategy for the development of Innovation [2001]).	The CISI Agency (Centres for entrepreneurship development) holds a Venture Capital fund to enter into the risk capital of SMEs for a short period of time [3-5 years] as a minority shareholder.
Emilia-Romagna	There is no Ministry in charge of innovation; it is the Ministry for Productive activities, Economic Development and Telematic Plan that is responsible for applied research, innovation and technological transfer.	ASTER is the regional consortium for industrial research, technology transfer and innovation created between regional government, universities, national research centres, the regional Chambers of Commerce and Industry and the regional entrepreneurial associations SPINNER supports new entrepreneurship around exploiting research and promoting R&D employment within regional SMEs, developing technology transfer projects.	RL 7/2002 regulates the promotion of the regional system of industrial research activity, innovation and technological transfer. There are two main policy measures: PRRIITT (Regional Programme for Industrial Research, Innovation and technological transfer); PRAI 2000-2006 (Regional Programme on Innovative Actions).	There is no real financial company that disburses funds and/or invests in companies' capital The region provides firms with consulting services through ad-hoc initiative such as the FIRST project (Funds for Innovation, Research and Technological Development).

	Regional Ministry/ Delegation to other Ministries	Specialised body/agency dealing with innovation	Regional policies for research and innovation (laws and policy measures)	Regional funds for risk capital
Lazio	There is specific Ministry for Economic Development, Research, Innovation and Tourism	FILAS is a development agency that manages tools related to innovation, new technologies and the network economy to strengthen the regional SMEs' competitiveness both of regional product growth and external investment promotion.	Policy measures: INN Governance programme 2003; DOCUP (*Documento Unico di Programmazione*) 2000-2006; QRVI (Regional Framework for the Evalutation of Innovation).	The major actor in participation in risk capital is FILAS, holding 50% of the market; it deals mainly with start up firms and SMEs of innovative sectors and is in charge of the disbursement of regional funds.
Lombardy	There is only a regional deputy-ministry for Higher Education, Research and Innovation.	There is no specialised body leading innovation and R&D related programmes; however there are agencies involved in these subjects such as the AIS *Agenzia Innovazione e Sviluppo* and the ASNM (Agenzia Sviluppo Nord Milano).	RL 2/2007 on Instruments for promoting territorial competitiveness in Lombardy Innovation is important in a number of policy measures, including the CSF for 2002-06, the regional operational plan, as well as regional framework agreements between partners (Region–Ministry of Education, Region–Unioncamere Framework).	The region participates in the capital of new innovative firms through its financial company, Finlombarda: this handles region's instruments such as short/medium term loans, finance leases, minority shares, etc.

Source: A.Piccaluga, A.Primicerio (2005), *Le Politiche regionali per l'Innovazione in Italia,* Rapporto predisposto da In-Sat Lab, Scuola Superiore Sant'Anna di Pisa, for Finlombarda.

It appears that there have been elements of homologisation across the various regional bodies within the Italian system, corresponding to the notion of lateral policy transfer set out in Chapter 1. In most regions, the regional authority created a specific ministry (Regional Ministry,or *Assessorato*) in charge of R&D and innovation policies, or delegated the legislative power on the subject to existing ministries, such as the ministries for economic development or education.

In all regions, the regional authorities maintain their exclusive co-ordination role, acting in collaboration with the local development agencies. Only two regions (Lazio, Emilia-Romagna) have chosen to delegate all the planning and managing activities related to R&D to a development agency. Every region except one (Marche) has explicitly set a goal of increasing their financing towards industrial and pre-competitive research, whilst adding the requirement that such initiatives must be business led, involving research centres and universities.

In spite of these similarities, Italian regions have exercised their constitutionally enshrined freedoms to define their own objectives and to select different stakeholder groups for participation in activities. Some regions have focused their attention on the support of innovation and research demand, whilst others concentrated efforts on reorganising and strengthening universities and research centres.

Many regions have planned to support the private technology demand, high value-added services that sustain innovation processes in firms, such as intellectual property rights and technology audit services. However, the only real generalisation that can be made about this is that the financing forms and the financing beneficiaries strongly differ from region to region, ranging over initiatives such as platforms, projects and consortia, as opposed to direct support to researchers and inventors. Whilst most regions have created *ad hoc* Committees or Councils to deliver evaluation and selection around implementing innovation support policies, these bodies differ from region to region in their composition, mission and duration.

Changes to the Machinery of the Piedmont Government.

The locus of the post-2005 reforms in Piedmont have been around creating a strong new centre of power to bring some coherence to a very wide range of innovation activities, networks and partnerships already under way. The programme for government for Bresso-I is entitled "An open, tolerant, innovative Piedmont" (*Un Piemonte aperto, tollerante, innovativo*), with "an efficient and friendly regional machinery" the central focus for administrative reform (Regional Government Piedmont, 2005).[4] This

document also reaffirmed the commitment of the region to hitting the so-called Lisbon target of 3% GERD in GDP.

A central theme emphasised within the Programme for Government was in developing an open culture of accountability and performance improvement in the central tasks of government. This programme included a specific reference to the priorities for strengthening the Piedmont regional innovation system, including:

- To stimulate and encourage networking between actors in the regional innovation and technology transfer system.
- To politically revitalise the technology parks and incubators.
- To transform what are currently real estate operations into centres of excellence integrating, search, application, technology transfer and new business formation.
- To create better support services for new high technology businesses.
- To create new venture capital funds for traditional and high technology sectors (notably aerospace, automotives, biotechnology, agriculture and food, mechatronics, new materials, ICT, and new energies)." (p. 8, author's own translation).

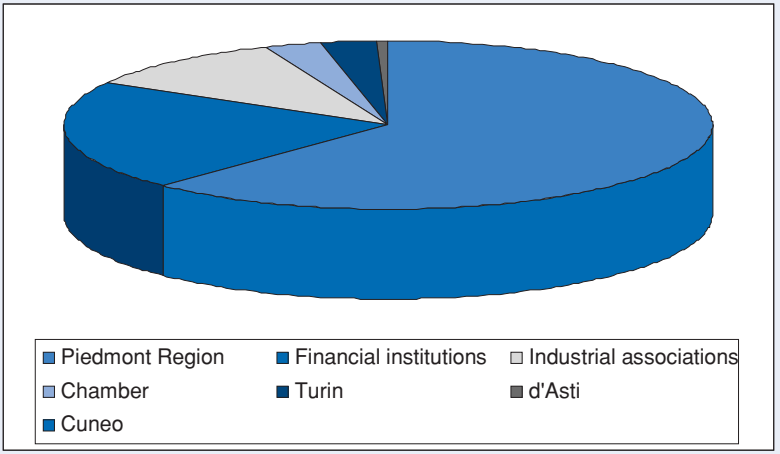
The first implementation signalled by this programme for government has been made at the regional government level, where a new Regional Ministry[5] (*i.e. Assessorato*) was created to oversee all the activity, with a dedicated Regional Minister (Andrea Bairati) overseeing delivery through the ministerial arm of the Regional Government. The new Regional Ministry, initially named the Regional Ministry for University, Research and Innovation Policies & Internationalisation,[6] has only recently been expanded to include in 2008 to include telecoms, e-government, industry and energy. It is responsible for defining, developing and overseeing strategies and policies of the regional government in these fields.

Box 3.1. **Recent changes to Finpiemonte**

The other main change in the machinery of government within the regional government has been a refocusing of the regional development agency Finpiemonte. The agency Finpiemonte is an economic development company which has existed since the 1970s as the executive arm of the economic development activities of the Region. For more than 20 years it was responsible for working in investments developing activities improving the regional economic environment with shareholders drawn from the region, public banks and other private institutions. It was established in 1977 with the Piedmont Region as the major shareholder (62.2%), and other local actors including:-

- Financial institutions and regionally headquartered banks (21.2%)
- Industrial associations (10.6%)
- The united chambers of commerce of Piedmont (2.8%).
- The province and city of Turin (2.7%).
- The province and city of d'Asti (0.5%).
- The province and city of Cuneo (0.1%).

The original investment capital of Finpiemonte, 1977



Source: OECD guide to local development (2005).

Box 3.1. **Recent changes to Finpiemonte** (continued)

Until July 2007, Finpiemonte SpA had two roles, an investment holding company and a regional development agency. When it was divided into Finpiemonte SpA and Finpiemonte Partecipazioni, Finpiemonte SpA retained the role of Region Piedmont's financial holding company and regional development agency, promoting complex investment projects targeted towards the region's economic development, economic diversification and innovation, infrastructure and cultural development. The two functions each have their own profile, on the one hand, managing investment funds and, on the other, developing strategic economic projects. In order to pursue its development objectives, Finpiemonte SpA supports three groups of actors within the regional research and innovation system: the technology and science parks, the incubators and the technological districts. Finpiemonte SpA acts as promoter and developer of the six science and technology parks, as well as for the incubators and the districts. Shareholding in the new Finpiemonte is weighted much more towards the Piedmont Region, with relatively small participations from a number of municipalities, provinces and Chambers of Commerce, shown in the table below.

The current investment capital Finpiemonte Spa, 2008

Finpiemonte Spa Shareholders	Share	Share %
Piedmont Region	EUR 19 272 196	96.713%
Turin Chamber of Commerce	EUR 251 652	1 263%
Turin Municipality	EUR 146 897	0 737%
Turin Province	EUR 146 897	0 737%
Asti Municipality	EUR 25 154	0 126%
Asti Province	EUR 25 154	0 126%
Biella Chamber of Commerce	EUR 14 483	0 073%
Vercelli Chamber of Commerce	EUR 11 434	0 057%
Cuneo Province	EUR 10 018	0 050%
Alessandria Chamber of Commerce	EUR 7 405	0 037%
Verbano Cusio Ossola Chamber of Commerce	EUR 5 989	0 030%
Cuneo Chamber of Commerce	EUR 4 138	0 021%
Novara Chamber of Commerce	EUR 3 049	0 015%
Asti Chamber of Commerce	EUR 2 831	0 014%
Total	EUR 19 927 297	100 000%

Note: Finpiemonte Participazioni on the other end, takes semi-commercial ideas which are sufficiently near to market to have the potential for profitable returns and develops them. So for example Finpiemonte SpA may develop a business plan for a new science park, but it would be the participation company which would deliver the project and operate the property business. This has been intended to create a much closer link between policy and delivery, and to provide much greater transparency over the progress being made in implementing the regional agenda for improved innovation performance.

Source: Finpiemonte Background Report (2008).

A further change has come with the re-organisation and re-naming of the organisation responsible for the science parks, Tecnorete, which was created in 2002 as a consortium responsible for the co-ordination of the regional science parks invested in through the European structural funds investments. This change was signalled in the 2005 programme for government, which argued for moving the science parks away from being real estate developments towards being centres of excellence in high-technology business incubation. The regional science park association was therefore renamed from 'Tecnorete' to Enzima-P, and its mission was shifted from facilities management to providing a first point of contact for businesses wishing to engage with the Piedmont RIS. These changes were legislated for in 2006, and came into effect on 13 March 2007. Although Enzima-P is a relatively new company, it is intended to evolve into a more strategic regional innovation body over the next five years. A decision has recently been taken to rescale it as a strategic body, complemented with 12 innovative clusters which are currently under construction.

The Regional Government has also been active in reforming institutions in other policy areas in order to improve their contribution to the innovation agenda. A good illustration of this comes with the Piedmont Agency for Investment, Exports and Tourism (CEIP). CEIP was created in 2006 from a merger of four antecedent bodies responsible for inward investment, internationalisation, place marketing and training for international trade. CEIP has become involved in a number of innovation projects in the region, supporting the aerospace, automotive and ICT sectors. The rationalisation of agencies in the region has made it easier for organisations to bring innovation activities into the mainstream.

The legal foundation for the regional Research Plan

One of the first acts of the incoming Bresso government was to pass a new regional law, "A Regional System for Research and Innovation" (RL04/2006). This defined the system as comprising all the public and private actors in a variety of sectors, including public, private and non-profit, which had a permanent established presence in the region (see Chapter 3). The law's objectives set out in article 2, included promoting research and innovation, consolidating the research system, and creating a culture of systematic evaluation and performance improvement within the field of innovation policy. It is this law which provides the legal foundation for the reforms which have followed in the last three years.

A central instrument for delivering the aims of this law has been the "three year Research Plan". This plan sets out in detail how, precisely, the objectives of the law will be met, highlighting the measures that will be made available, where investments will be made and the general principles underlying the three year expenditure plan. The Research Plan was published by the Ministry for Innovation and approved in January 2007, and identifies five action lines into which funding will be diverted, along with the relative weighting which will be given to each of the areas. These weightings are reproduced in Table 3.2.

Table 3.2. **The branches, weighting of the three year Piedmont research plan**

Branch	Sub-branch	% per branch
A. Human resources (25%)	International network exchanges	65%
	Collaborative doctoral programs	10%
	Postdoctoral fellowships	20%
	Lifelong learning	5%
B. Investment in industrial growth (30%)	Developing technological platforms	35%
	Investing in company growth	15%
	Driving innovation in the supply chain	50%
C. Supporting knowledge generation (30%)	Science push tenders	50%
	Pre-competitive research tenders	50%
D. Encouraging knowledge utilisation (10%)	Valorising investments	50%
	Supporting investments	50%
E. Technical assistance (5%)	Support for the development of IP	60%
	Development of analytic tools	10%
	Strengthening intermediary institutions	20%
	Communications and PR	10%

Source: Finpiemonte Background Report (2007).

These activities are mapped to the Structured Toolbox of Innovation Policies, developed by Frauenhofer ISI, in Table 3.3.

Table 3.3. **Structured toolbox of policy measures currently implemented in the EU: Piedmont's research plan benchmarked**

Objectives	Target Groups	Policy Measures
Improve innovation governance and strategic intelligence for policy making, strategic vision, innovation studies, innovation strategies, trans-national co-operation, policy learning.	Policy makers, regional stakeholders, (firms, universities, research centres).	Strategic vision B1: new platform prospecting and feasibility B2: platform incubators E6: foresight, innovation studies and evaluations E7: Evaluation and benchmarking, innovation strategies B1: New platform prospecting and feasibility, trans-national co-operation A1: Attract foreign researchers A6: Foreign teachers for doctoral courses
Foster an innovation friendly environment, simplification of administration, regulatory environment, state aid for innovative firms, information exchange via e-portals, boosting technology adoption.	Enterprises universities and (public) research institutes, public sector and administrative representatives, innovation agencies employees.	E1: European fund raising E11: Dissemination of scientific and technological culture administrative simplification, regulatory environment state aid for innovative firms information exchange, *e.g.* via e-portals E12: Research portal, boosting technology adoption
Higher Education / Human Capital Development / Gender Issues	Higher education institutions research centres.	A1 and A2: Attract foreign researchers and students A3: Research networks A4: Researchers abroad A5: Brain drain A6: Foreign teachers for doctoral courses A7: Doctoral programmes A8: Life-long learning A9: tenders for the young A10: Visiting fees
Development of Research Infrastructure	Higher education institutions public research institutions.	
Strengthen innovation, including the protection and commercialisation of intellectual property. Direct Innovation Support Innovation skills Non-technological innovation Intellectual property protection Research Commercialisation Tax incentives	Enterprises	B5: Supply chain innovation D5: Demand pull tenders, Direct Innovation Support, innovation skills, non-technological innovation, intellectual property protection. E2: Alternative forms of protection for intellectual property E3: Patents fund

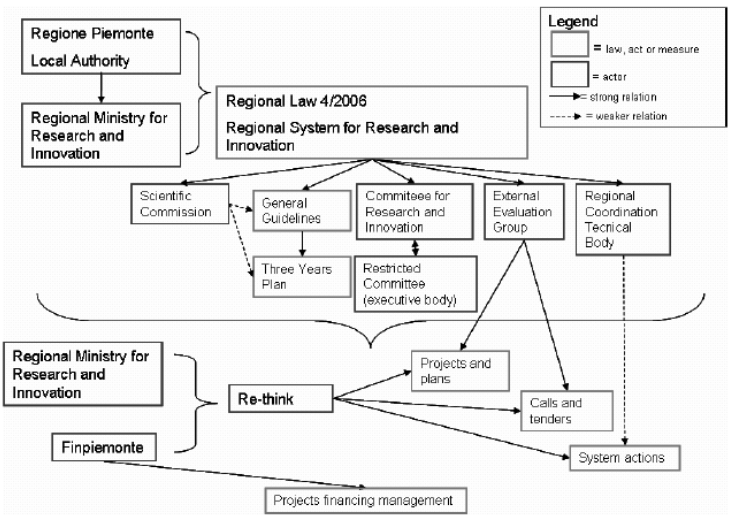
Objectives	Target Groups	Policy Measures
Innovation management Financing of R&D and innovation		E4: Patent registration vouchers Research Commercialisation B3: Living Labs Tax incentives Innovation management E10: Educational programmes for innovation managers Financing of R&D and innovation B4: Size increase
a) Strengthen innovation in the SME sector	Enterprises (SME), public sector, banking/financial sector.	D2: Technological check-up E5: Sensor project
b) Industrial policy and strategic technology policy	MNE co-operations	A3: Research networks
Encourage technology and knowledge transfer to enterprises and development of innovation poles and clusters. Recruiting innovators Technology transfer Innovation intermediaries Innovation infrastructure Co-operation and networking Cluster management	Enterprises, public research institutes, universities, policy makers (on regional level).	C1: Science push tenders C2: Pre-competitive research centres, recruiting innovators A1 and A2: Attract foreign researchers and students A8: Life-long learning, technology transfer D1: user groups D3: Technology transfer by heads, innovation intermediaries E8: Integration and strengthening of bridging institutions (company side) E9: Integration and strengthening of bridging institutions (university side), innovation infrastructure, co-operation and networking. A3: Research networks D4: Shared laboratories Cluster management
Promote and sustain the creation and growth of innovative enterprises. Funding innovative start-ups. Entrepreneurship support infrastructure. Leveraging private innovation finance. Optimising financial regulations.	Students, general public, banks/financial sector, universities and public research.	B4: Site increase, funding innovative start-ups, entrepreneurship support infrastructure. B2: Platform incubators, leveraging private innovation finance /optimising, financial regulations.

The law also established a number of committees to oversee the writing, implementing and evaluation of the plan. A Regional Committee of stakeholders provides oversight of the formulation and implementation of the plan. A Restricted Committee of selected stakeholders acts as the executive body for the plan and provides secretariat services for the Regional Committee. A Scientific Committee expresses opinions on the plan, the general lines of intervention, and the general approach to

evaluation set out in the plan. The Technical Committee serves as a conduit for interaction between recipients of funding and seeks to create added value by creating new interactions between research, innovation and production activity.

The law therefore provides a basis for a much more hierarchical sense of direction to be imposed on the way that innovation policy is implemented. The Structural Funds Committee (DOCUP), which operated in a depoliticised and uncontrolled manner, is replaced with a three tier system. At the top of this system is the lead legislative body, the Regional Government, which provides the resources, the principles and the oversight of the decision-making process. Their interest is enshrined within the law and research programme. Underneath that is a group of committees which develop programmes and instruments to spend the resources, which are also directly overseen by the regional ministry, as well as the RDA. Beneath them are individuals and partnerships making proposals into the plan committees, which are subject to external monitoring and evaluation by the programme committee. The hierarchy created by this situation is shown in Figure 3.1.

Figure 3.1. **The functional organisation of the implementation of the Piedmont RIS Law**



Source: Finpiemonte Background Report (2008).

There are three principal committees which determine the governance of the regional law and the execution of the research and innovation strategy. These four committees are established through the law:

- the Regional Committee for Research and Innovation;
- the Restricted Committee;
- the Scientific Commission;
- the External Evaluation Group.

The Regional Committee for Research and Innovation is the direction setting body for the operation of the law. The Committee must include the Chairman of the Regional Executive Council, and representatives from the *Compagnia di San Paolo*, the CRT Foundation, *Confindustria Piemonte; Federapi Piemonte*, the Artisan Unions, *Unioncamere Piemonte* and the Association of the Foundations of the *Casse di Risparmio Piemontesi*.[7] Each of the four regional universities can also propose one member for this committee. This committee then co-opts a further 25 stakeholders chosen to be most representative of local bodies, environmentalist groups, science parks, research organisations, cultural foundations, labour unions, higher education, trade and farming. This committee can range, therefore, in size from 34 to 37 members.

The Restricted Committee provides the executive body directing the implementation of the research plan. This committee is drawn in its entirety from the Regional Committee, but is much more restricted in its membership, including the Chairman of the Regional Executive Council, and representatives from the *Compagnia di San Paolo*, the CRT Foundation, *Confindustria Piemonte; Federapi Piemonte*; and the Artisan Unions. If the universities have representatives on the Regional Committee then they are also members of the Restricted Committee. One representative from the research sector and one representative with a background in unions, higher education, trade or farming are chosen. The restricted committee ranges in size from 8 to 14 members.

The Scientific Commission is a reflective body for the Regional Committee, and helps provide a wider intellectual context for the implementation of the plan in the light of global best practice and knowledge about economic and technological opportunities within Piedmont and beyond. The Scientific Commission is staffed by five scholars or researchers of international standing, selected from among university teachers, researchers and personalities with high scientific qualifications.

The Commission can also use external experts within the limits established by a resolution of the Regional Executive Council.

The external evaluation group is made up of five professors of international standing. The five professors appointed to this role were Antonio De Flora, Antonio Peretto**,** Alberto Silvani, Maurizio Sobrero and Ugo Valbusa. They were nominated by the Regional Government in March 2008. They subsequently met twice in 2008, in July and October, and have the remit to evaluate the implementation and outcomes of the chosen activities.

Critical decisions taken in the implementation of the policy

The Research Plan has a number of core areas of activity, and progress on these different fronts has proceeded at different speeds. The easiest of the activities to initiate was in funding pre-competitive and industrial research proposals, where research organisations and firms make collaborative bids for funding. Progress in establishing technology platforms has been somewhat slower with one platform for aerospace proposed in 2006, and a further platform in biotechnology established early in March 2008, along with a Steering Committee on Info-mobility, Logistics and Sustainable Mobility; moreover, calls have been issued to establish steering groups in agro-food and multi-media and creativity.

The funding for the Research Plan is jointly negotiated between the Region and Finpiemonte, the regional development agency. These two bodies have created an *ad hoc* think tank to help reflect on the development of policies, and to ensure that the particular instruments proposed do guarantee the guiding principles for the project seeking to make innovation more central to policy making in Piedmont. This has been necessary given the culture of mistrust between partners in the field of industrial policy. As one industrialist noted during the field visit:

> "It is a question of confidence in others. In Piedmont, there is a tradition of not trusting anyone, which must be overcome. There needs to be a neutral arena where discussions can take place, in a semi-formal atmosphere. High-level intermediation could be detrimental."

Rethink has stressed four principles in its recommendations which seek to ensure that all activities funded are contributed to developing a more transparent and less confusing regional innovation system. These principles are:

- Funding the demand-side only where there is market failure and on the supply-side only in pre-competitive technological areas.

- Aiming to raise both levels of business innovation and levels of human capital, with highly-skilled individuals as a key technology transfer mechanism.
- International peer review of scientific proposals to ensure complementarity with activities funded under Framework Programmes.
- Networking with Italian and European partners to develop shared critical mass and to exchange best practice in achieving the target of 3% GERD in GDP.

The first opportunity made available under the plan was a "call for industrial research and pre-competitive development activities", with a total budget of EUR 32 million. This was targeted on 6 sectors in line with the Research Plan, namely alternatives and sustainable energies, sustainable mobility, biotech-life sciences, nanotech, aerospace, and agri-food. Eligible projects had to involve university and enterprise partners, and be of a project size of between EUR 0.5-2 million; there was also a budget line for young researchers for projects of EUR 50 000-200 000. The projects were selected from an international evaluation panel assembled from reviewers who had participated in the 6th Framework Programme evaluation round. The 2006 round also involved the creation of a Technology Platform for Aerospace, and the creation of a fund for innovative SMEs, the so-called "Innovation Voucher" scheme.

There has been a subsequent round of investments in 2007, which continued the main thematic lines established in 2006, including targeted research investments in selected high-technology sectors (mechatronics and convergence technologies), starter grants for new post-doctoral researchers.

A central element of the Research Plan has been to ingrain a culture of monitoring, innovation and selectivity into the way activities are chosen. It has long been recognised with the European Commission that a failure to develop the right attitude towards innovation amongst policy makers can erode the capacity of innovation policy to improve regional performance. It is vital to create an acceptance amongst regional partners that only the best, and not the most popular or politically backed projects must be funded, and that innovation funding must not become a mechanism to support activities which cannot be funded from other budget streams. The mechanism for the selection of research projects attempts to ensure that only world-class scientific proposals are chosen for funding, by using an international network of reviewers with experience in the Framework Programme review process. Likewise, the Scientific Commission established under the regional law have also the task to build capacity amongst regional partners to be able to take a more systematic approach to innovation.

Part of the Regional Government's resources have also been invested into PR and marketing for Piedmont. One highly visible activity was the publication in September of a special advertising section in the *Scientific American* journal entitled "Piedmont: here you can". This contributes to place-marketing of the Piedmont RIS by setting out the key actors involved in Piedmont in order to try to attract new businesses to the region. Although this was targeted primarily at potential investors to the region, it symbolises the efforts being made to rethink the RIS as a system of interconnected actors.

Table 3.4. **The main project lines of the regional research plan, 2007.**

Measure	Designed for	Budget
Aerospace cluster platform	Institutions, Universities, businesses (major companies and SMEs)	EUR 30m
Biotech cluster platform	Institutions, Universities, businesses (major companies and SMEs)	EUR 20m
Innovation Clusters (*poli di innovazione*)	Businesses, S&TPs and research centres	EUR 60m
Industrial research and pre-competitive development call	Universities, research centres and businesses	EUR 32m
Converging technologies call	Universities, research centres, S&TPs and businesses	EUR 30m
Advanced Systems production call	Businesses, Universities, public and private research centres and research organisations	EUR 20m
ICT call for SMEs	SMEs	EUR 25m
Human and social sciences call	Universities, public and private research centres and research organisations	EUR 10m
Innovation Voucher	SMEs	EUR 12m
Transnational co-operation network participation (Manunet)	SMEs	EUR 9m
Fellowships for researchers and academic mobility	Researchers and visiting professors in collaboration with *Regione Piemonte*, Universities, public research centres and institution for artistic education (CRT Foundation as co-financer)	EUR 20m
Agreements	Other regions or states and other public actors	EUR 15m
ESOF 2010/ science communication and popularisation	General public	EUR 10m
ERDF measures on energy	Businesses and local authorities	EUR 100m
Total exc. ERDF Energy measures		EUR 290m
Total inc. ERDF Energy measures		EUR 390m

Source: Finpiemonte Background Report (2008).

Mainstreaming and the sustainability of Piedmont's innovation policy

The total financial envelope for the three year plan is relatively restricted, being set within the Research Plan at EUR 270 million. This represents the full financial contribution to be made by the Regional Ministry of Innovation over the three year life cycle of the project. However, the intention is to ensure that the total financial influence of the project is much greater. In particular, there is an explicit desire amongst the Innovation Ministry that other regional departments are investing in activities which contribute to the overall development of the regional innovation system. These principles have been set out in the guidance given to the Rethink "think tank". By shaping its decision taking, they have attempted to create a common set of principles for the region of Piedmont. The principles behind the policy are:

- Selectivity: the double-track strategy.
- Intervention only where market failures exist.
- Support to innovation demand and technology transfer.
- Focus on human capital.
- International evaluation for regional call for proposals (FP6 evaluators).
- Enhanced co-operation in R&D with other Italian Regions (agreement between Piedmont, Lombardy, Emilia-Romagna, Umbria and Sardinia) and with European networks of Regions (Regions of Knowledge, Regions for Economic Change, ERRIN, IRE…)

Source: Calderini (2007).

Ensuring regional actors conform to the principles of the plan

The main class of actors which will contribute directly to building the regional innovation system are existing innovation funders in the region. The Research Programme operates under the principle of co-financing, which requires that all projects funded include regional research and business partners. For technologies deemed to be "technology pull" industries, and near-to-market, then there is a requirement that firms make a substantive investment in the research. For other technologies which remain blue-skies and "science push" in nature, then business co-financing is limited to a much more tokenistic contribution. The division between "technology pull" and "science push" on a sectoral basis made by Piedmont is shown in the Table 3.5.

Table 3.5. **The sectoral division between "science push" and "technology pull" industries**

Science Push	Technology Pull
Life-science and biotechnology	Environmental safety
Nanotechnology and advanced production processes	Agro-industry sector and product traceability
New materials	Advanced health services
Alternative energies	Advanced logistics
	Aerospace
	Intelligent and sustainable mobility
	Creative and multimedia companies
	Heritage conservation and transformation

Source: Finpiemonte Background Report (2008).

A second group which the Regional Law wishes to influence are existing innovation service providers and partnerships within Piedmont. The Regional Law and its elaboration have set a very strict set of criteria for investing in particular research and innovation support activities. Only those activities which conform to the plan's commitment to programming, focus, excellence and evaluation are to be funded. Because a range of regional partners with their own income streams and R&D expenditures are involved in business support projects and partnerships such as the science parks, the universities, the research foundations (see following chapter) and businesses, the Research Law attempts to nudge these bodies to fit with the desired regional innovation policy culture in Piedmont.

A third group which are being targeted are policy makers within the Regional Government, but within other policy areas. The Regional Government Accord provides a strong rationale for this, as the whole government is committed to making innovation central to the culture of the region as well as restoring government oversight to the delivery of regional funding. Territorial development policies are important to the achievement of the Research Plan, as a number of the existing development and regeneration activities, such as the Tecnoparco at Lake Maggiore as well as the ongoing Mirafiore design centre on the former eponymous FIAT site in Turin involve a science and innovation component for their success. Finpiemonte is also involved in these projects and will therefore provide a key mechanism for joining up and mainstreaming innovation as a policy target into a range of other areas, including transport and planning (*urbanistica*).

Achieving critical mass within Italy

Given the increasing but rather small envelope provided by the Research Plan, the region is explicitly targeting increasing its income from national policy measures, as well as building collaborative alliances with other Italian regions. One issue facing all Italian regions is the constraints placed on the higher education system as a result of the national government to cap the funds provided to universities. This has had the effect of driving universities to seek novel sources of income but reduces the interest in lobbying the Italian ministry of higher education, the MIUR (Ministry of Education, Universities and Research), for additional funds.

There are Ministries which do have funds and activities which could conceivably support innovation activities in Piedmont. MIUR funds the *Consiglio Nazionale delle Ricerche* (CNR), which allocates funding both for university-based research as well as funding National Research Centres. Piedmont has a large number of these research centres. Despite being national research centres, they nevertheless contribute to the regional innovation system. The investment and regulation decisions which the government take around these research centres have the potential to profoundly influence the capacity of Piedmont's innovation system.

A second important element of MIUR policy, which directly influences Piedmont's innovative capacity, is its investments in regional competitiveness hubs as a means of targeting innovative businesses. In 2002, MIUR, along with regional partners and businesses invested in the Torino Wireless Foundation (TWF), which aims:

- "to create and develop the Piedmont **High-Tech District**, by increasing **ICT** contribution to regional wealth and positioning Piedmont amongst the internationally most innovative clusters" (article 3.2, Torino Wireless by-laws).
- Piedmont is therefore keen to create capacity to capture future large-scale investments from the national government which bring together innovation, entrepreneurship and business growth in high-technology fields.

There is a formal organ through which the Italian regions interact with the national state, the *Conferenza Unificata Stato-Regioni*, the State-Regions conference. This is a dialogue between the state and regions on policies, which aims to support co-ordination between these various tiers.[8] The State-Regions Conference:

- Provides opportunities for the Government to take soundings from the Regions on the most important administrative and normative acts that interest the Regions themselves.
- Attempts to foster close collaboration between national and regional administrations.
- Holds appropriate meetings as necessary to discuss any aspects of European Union policy concerning Regions and Provinces (*sessione comunitaria*).

This State-Regions Conference became particularly important after 2001 when changes to the constitution meant that it became the leading Constitutional co-ordination mechanism between the State and regional levels. There are discussions around the co-ordination of industrial policy within this institution, although the discussions cover the full gamut of policy discussions.

Perhaps unsurprisingly, the overlapping responsibilities between national and regional Governments for innovation policy have meant that there are a number of agreements negotiated between these two levels to give coherence to their collective activity.

One final area where Piedmont is seeking to develop further co-ordination is with other Italian regions with similar interests in R&D and innovation. The region has signed co-ordination agreements in the sphere of R&D with a number of Italian regions, including Umbria, Sardinia, Emilia-Romagna, Liguria and Lombardy, and the aim is to increase the critical mass within Italy. This focuses on two areas, firstly to position Italian research groups in the public and private sector to better compete for Framework Programme funding, and secondly to encourage technology transfer by sharing and comparing experience. Piedmont has agreements with Umbria and Sardinia, as well as a three way relationship with Lombardy and Emilia-Romagna. Although these agreements do differ in their detail, they at least express the clear intent to ensure that relationships promoting innovation are built wherever appropriate.[9]

Building capacity from European investments

The region does not only wish to enrol and configure regional and national actors into supporting the delivery of its innovation policy. The Regional Government is also targeting external actors who spend money within the region, to try to configure their activities to support the goals and the projects of the Research Plan. The European Commission are one such core target, both in the research and regional policy fields. The Piedmont

Regional Government is attempting to use its own funding to improve the quality and excellence of research funding applications as a means of increasing the total research funding won from the European Framework Programme.

Subjecting local teams to international peer review provides two potential regional benefits. Firstly, it prepares regional researchers for the demands of international peer review. Secondly, it helps Piedmont's researchers to make connections with external research teams, which might later form the basis for large scale collaborative projects.

The Structural Funds have provided an important financial resource for innovation activities in Piedmont, and so the region is naturally concerned what the impacts for the post-2013 loss of funding will mean for innovation policy. It is clear that the future of innovation funding from Europe after 2013 for western European regions will involve building networks which help to spread best practice in innovation policy and encourage collaboration in the field of innovation between firms located in different regions. The region has experience via two Innovative Networks, ERRIN and SESAMES. ERRIN is a traditional network encouraging exchange of best practice between innovation business support organisations, whilst SESAMES was a collaborative project for the automotive sector between Piedmont, Puglia (I), Baden-Würrtemburg (D) and Weser-Ems (D). These kinds of innovation networks are being emphasised as necessary to ensure that Piedmont continues to benefit from the inflow of European funding.

The problems and reasoning underlying the plan

The rationale behind the plan was that there needed to be a change in the way that the business of innovation was undertaken in Piedmont. As highlighted in the preceding chapter, the region has a relatively small number of highly innovative firms, and its workforce skill levels reflect the historically available occupations in the manufacturing industries. The critical demand placed upon policy in recent years has been to help the long tail of non-innovating firms, often SMEs in otherwise competitive industrial districts to improve their overall level of innovation. This is to be achieved in terms of raising R&D expenditures and employment, patenting outputs and productivity growth levels.

The actions that have been taken in Piedmont reflect the particularities of the regional situation, and in particular, the desire of the incoming 2005 Bresso Government to make a clear break with the policies of the preceding government. The Regional Law set the ambition of taking action to build a

regional innovation and science system. This marked a break from previous practice in three main regards.

The first was in a desire to make use of the new opportunities opened up by regional devolution in 1998, which granted regions competencies in the fields of science and innovation but which remain unused within Piedmont. The second was the wish to avoid further complicating an already dense innovation ecology in which many businesses complained of not being able to access the institutions supposedly available for assistance. The third was to shift the way that the Regional Government was delivering its policy, from stipulating particular instruments for helping firms, to supporting networks and partnership organisations which generated benefits through collaboration, allowing the Region to perform a more strategic oversight of the RIS.

Exploiting new powers for the regional tier

The Bresso Government was the first Piedmont Regional Government that had been elected with the opportunity to make use of the powers and resources made available under the 1998 and 2001 constitutional reforms. Innovation had not formed part of the electoral mandate for the previous governmental regime, and so there had been no opportunity for the then Regional Government to develop an innovation policy. Nevertheless, the previous Regional Government realised that the opportunity was potentially there, and in the later years of its administration a regulation was drafted and brought to the Regional Assembly for a regional research and innovation plan. Although this plan was not approved, this did mean that Piedmont's administrative machinery was well-prepared in 2005 for the legal manoeuvres necessary in order to introduce a regional Research Plan.

The newness of the idea of regional research and innovation policy has meant that a major part of the reforms have focused on creating a sustainable basis for regional innovation policy. Prior to 2005, innovation was *ad hoc* and without its own budget line, and therefore restricted to what could be promoted through other activities and funds, such as the EU structural funds. From 2005, it was possible to invest directly in innovation activities, which in turn required a strong institution arrangement to drive through a shift away from funding existing activities to allocating funding on the basis of explicit goals, strategies, targets and outputs. The main changes made in response to these new opportunities are outlined in Table 3.6.

Table 3.6. **The response of Piedmont to the opportunities for new innovation policies made available by devolution**

New regional opportunities	Piedmont's response
Regional Ministry/ Delegation to other Ministries	A Ministry for University, Research, Innovation Policies and Internationalisation was established in 2005.
Specialised body/agency dealing with innovation	There is no specialised agency in charge of innovation and research promotion; it is the region's financial institution, Finpiemonte, that plays the role of a development agency.
Regional policies for research and innovation (laws and policy measures)	RL 4/2006 regulates the regional system of research within the European Research Area. Policy measures: the General Lines of Intervention and the Three-year Research Plan; the SF plan 2002-06,. The Regional Plan for e-Government..
Regional funds for risk capital	The region's financial company, Finpiemonte, encourages and invests in the formation of new highly-innovative firms.

Source: Piccaluga & Primicerio (2005).

Piedmont is not significantly out of step with the most important regions that have adopted a regional approach to supporting research. The region cannot count itself at the cutting edge of the institutional changes to develop innovation support mechanisms. But it has certainly followed a path laid out by other regions which have longer track records in supporting innovation (notably Emilia-Romagna). The changes implemented in Piedmont also appear more wide-ranging than those adopted in the neighbouring (and also economically more successful) province of Lombardy. This reflects to some extent that it is those less successful regions in Italy that have had both the resources and the motivation to be the first to adopt innovation policy as a tool with the potential to solve the wide-ranging economic problems those regions face.

Creating a more open and transparent regional innovation system

A second motivating factor behind the reforms was a concerted attempt to deal with the perceived complexity of the regional innovation system. The increasing accent placed by the European Commission on innovation as a central plank of Structural Funds' interventions had meant that there were a very large number of organisations claiming to be active in the field of innovation. There were very many projects being undertaken. In the absence of an efficient and streamlined evaluation culture, it was very difficult to distinguish which of those projects were working well and which were not.

This situation was further undermined by the fact that the sheer volume of projects funded was a distraction and a barrier to access for potential users of those projects. The Chambers of Commerce argued that any firms seeking to expand their horizons and become innovative firms faced such a

prolonged and haphazard search for help that the value of the subsidy could not be justified in terms of the time taken to locate the correct supporting institution. There was therefore a strong justification for ensuring that this system was rationalised, so that only the best projects were funded, and so that there was a clear set of pathways which encouraged interactions between firms and support providers.

This explains the reason for the choice of a regional innovation system building approach to the policy, explicitly taken in the name of the Law, "A Regional System for Research and Innovation".

There can be many reasons why firms and universities do not interact with other local actors, a prime cause often being sectoral mismatches between the kinds of research undertaken by regional universities and that which is of interest to local businesses, or the relative levels of expertise on each side. These mismatches can be very difficult to address by policy because they require investing in new research centre and teams, or providing bridging institutions to bring businesses into universities and research centres. These two quotes from the Peer Review highlight the depth of the barriers to interaction which have traditionally held in Piedmont.

> *"We have understood that innovation takes its roots in education, research and technological transfer. That is only possible if we create an innovation-oriented melting pot in the universities. We have to bring industry into campus life. We must create new opportunities for students, particularly postgraduates. We need to create incubators and lend support to venture-capitalists. We need to orient higher education not just towards basic research but also towards innovation." (an academic).*

> *"The universities' role has to change to become the driving force behind innovation. But the standards of excellence of each constituent part must be co-ordinated. Co-operation with the regional government is essential. Without it, nothing is possible." (an academic).*

But it is not just mismatches between knowledge producers and exploiters which can be problematic. In Chapter 1, we highlighted the fact that particular places have their own kinds of barriers, highlighting fragmented metropolitan regions, old industrial regions and geographically peripheral regions. Geographically peripheral regions have difficulties in building critical mass and world-class research, and so face the unlikelihood of being able to match world-class research and industry together in their region. Old industrial regions are often locked into divergent trajectories, often with firms' and universities' research interests moving apart from one another. Fragmented metropolitan regions are often successful but that

success has been achieved without local interaction, and no effort is made to explore whether there are regional benefits to greater co-operation.

In 2005, it was very difficult to be able to say objectively *where* the barriers in the Piedmont RIS lay, because of the complexity of the system and the connections between activities. A number of barriers could be hypothesised:

- **bridging institutions** were faulty and were of no use in helping firms and universities work together;
- a **mismatch between firms and universities** meant that, other things being equal, they were unlikely to be able to work successfully together;
- **complexity as a barrier,** with firms prevented from accessing innovation resources by the confusion associated with the system;
- **displacement effects from public investments** with private innovation consultancies being driven out of Piedmont by subsidies to public projects.

Each of these barriers would require a very different policy response, and the Regional Government stressed the importance of understanding the innovation system as a means of better managing that system. The legal foundation for the Research Plan has attempted to ensure that public funds invested by a range of agencies in innovation in Piedmont conform to a set of basic principles. The principle of "evaluation" is highly important in ensuring that the institutional reforms to the innovation system are paralleled by a wider learning regional process creating knowledge about the functioning of the RIS. The intention is, therefore, that at the end of the three year Research Plan, regional actors are sure that they have a well-functioning innovation system in which instruments do not have to compensate for problems created by other instruments.

Shifting the culture of governance from service provision to system building

The third rationale behind the post-2005 reforms has been to consolidate what has been achieved in the last decade, whilst also ensuring that it is brought more thoroughly under the control of regional politicians. Prior to 2005, innovation policy could be regarded as being pursued in an opportunistic and experimental manner. Policy was opportunistic because it responded to the availability of funds, and in particular to assembling consortia to exploit the availability of outside funds (such as Torino Wireless Foundation). It was experimental because of the relative novelty of

innovation policy in Piedmont and gave few indications of what would prove to be successful.[10]

These two features have contributed in part to the complexity of the RIS, which was also a consequence of a very large number of actors simultaneously becoming interested in the innovation agenda (see following chapter). However, they also embodied a very particular set of beliefs about *how* policy should support innovation, and the potential scope that this allowed for innovation activities. Nauwelaers & Wintjes (2002) note that in innovation policy, there is generally a trade-off between direct provision and influence of particular instruments:

- Funding individual businesses to undertake innovation is very expensive, but a regional authority can be certain that those firms are innovating.
- Funding network or clusters of firms (in which collaboration helps firms to access better innovation resources) allows more firms to be supported, but at the expense of the certainty of what particular firms are doing.
- Funding innovation strategies, in which partners propose their own partnership projects which are part-funded by regional authorities, increases again the number of firms that can be assisted, but further reduces certainty over the fact that firms are innovating.

Piedmont's approach falls squarely into the third category, which pre-supposes a certain degree of prior expertise in regional innovation policy management. Problems can arise if regions attempt to move too quickly, and to fund networks where there are not already innovating firms, or to write strategies where there are not already innovation networks. Conversely, if the region already has effective support for innovating businesses and networks, then there are opportunities to increase the yields and reduce the public investment required by introducing an element of strategic co-ordination. However, upgrading the quality of regional innovation policy, from direct service provision to strategic leadership is fraught with danger. In particular, it can prove disastrous for newly innovating firms if resources are withdrawn from direct business support to be placed into strategic activities (or strategy-writing activities). The question is whether the Piedmont region can negotiate these two tensions.

For Piedmont, the problem was quite clear, namely that it was funding a lot of direct intervention projects such as science parks which reduced the overall control over the interventions. Many of these activities were identified as being highly successful both within the region, but also by

external actors including the Italian government, the European Commission and the OECD. A university incubator (I3P) had evolved into a 'RIS-in-miniature' and was beginning to produce a stream of new high-technology businesses. The challenge was to find a way to shift its own perspective to a more strategic level without reducing its capacity to stimulate individual new partnerships.

The region intended to take the business support tools and networks which already existed, and subject them to a new "strategic regime" which regulated the existing activities around the Regional Government's single vision of a more innovative Piedmont regional economy. This intended to ensure a focus on innovation support which promoted business innovation, but as an additional requirement, those activities also fitted with the principles of the Piedmont RIS.

This represented an attempt by the incoming regional government to shift (upgrade) the quality of regional innovation policy making through the imposition of a new approach to regulation. In part, this reflects the need for the region to catch-up on a number of regions which had already developed more capacity and knowledge about their regional innovation activities. In the 1990s, the European Union funded many regions to develop their own innovation strategies. Piedmont, although eligible to participate, did not participate in this European activity, which emphasised transparency, capacity building, learning from best practice and strategy development. Clearly, an important issue for Piedmont has been to catch up with those regions that have already had the opportunity to get through their own learning experiences.

The changes in long-term perspective

The changes that have been made since 2005 are largely a reaction to the conditions perceived to be prevailing at that time. One driver was a feeling that the limit had been reached with how far Structural Funds could support innovation without introducing a strategic oversight and control element into regional institutional structures. A second driver was the fact that the new government after 2005 had both the powers and the resources to develop a serious territorial innovation policy.

However, the changes that are being made are not a specific response to a particular crisis in the early 2000s. From the late 1980s, there was a realisation that the large firms' declining employment was irreversible and so alternative employers were sought. Devolution in Italy has been an ongoing process both in response to national level constitutional crises as well as to meet the demands of very different kinds of regions within a

single nation-state. These longer-term drivers also shape the extent to which the changes in Piedmont are able to harness past successes and represent an evolution in governance.

The case of the Winter Olympic Games which came to Piedmont (Turin and the Olympic valleys) in 2006 highlights the negative influence which these background problems can create, as well as the fact that they can be addressed. In short, provinces and municipalities outside the Olympic Zone feared that the investment for the Games would come at the expense of their infrastructure budgets. Unified support for the bid from all regional actors was facilitated by national resources for sporting infrastructure and a local compensation programme investing in tourism facilities outside the Olympic Zone.

These resources have clearly created institutional capacity, the desire to invest in hosting like events with similarly uneven sub-regional impacts demonstrating that some existing regional tensions were ameliorated. Piedmont now has a rolling programme of international festivals, including the World Student Winter Games (2007), the World Design Capital (2008), the World Air Games (2009) and Euro Science Open Forum – ESOF (2010). This raises the question of whether the short-term changes to innovation policy are also building the necessary capacity to address three longer-term problems which afflict the region's innovation policy.

Enduring political barriers within the Piedmont's RIS

The RL4/2006 presents the re-organisations to the Piedmont RIS as creating a new hierarchy of actors able to ensure a more systemic approach to innovation investment. However, although the constitutional amendment of 2001 granted the regions new competencies, it also affirmed the constitutional principle of subsidiarity that every decision is taken at the lowest possible level of government. Despite the fact that the trend with Italian devolution has been to strengthen the regional base, the sub-regional levels remain influential in a variety of fields relevant to territorial innovation policy.

In Piedmont, there has been a tendency towards a high degree of autonomy and separation between provinces and municipalities (Kresl, 2005). This has been manifested in a tendency for authorities to be suspicious of intra-regional collaboration where there are not clear benefits for all parties in co-operation, as demonstrated in the case of the Winter Olympic Games. This problem has also been historically visible in discussions around collective planning for the Turin city-region in the late 1980s and early 1990s. Turin, a city of 2.2 million people in a region with a population of 4.3 million, is a large competitive city whose spatial influence

spreads far beyond its territorial boundaries. Many municipalities outside the city and province benefit from its success and suffer from its short-comings. Effectively planning for Turin's growth requires effectively planning across this whole city-regional space. But efforts to create a pan-urban management (or even discussion) authority remained unresolved until 1994, when they were shelved pending the amendments to the national constitution (Maggi & Piperno, 1999; Kresl, 2005).

Where there has been success in building collective authorities is where there are successes in which additional authorities wish to participate because of the obvious value of their participation. One example of this is the CSI-Piedmont organisation, created in 1977 to create a regional ICT network infrastructure to help local authorities and HEIs with their data processing needs. CSI-Piedmont was established by the region and the two universities, but in 1979, the city and province of Turin both joined the organisation. From that point onwards, the organisation has grown to include 7 of the 8 provinces, 23 municipalities, a municipalities association and 2 mountain communities. Although formed as a provider of data processing and related training, it has grown to become a large consultancy business employing 1 200, and hosts a regional centre of excellence in "Research, Development, and Experimentation of Advanced Computer and Telecommunication Technologies" (CSP).

Box 3.2. **Successful city-regions demand successful city-regional authorities**

Comparisons can be drawn between the case of Turin, and the development of a formal planning authority for the city-regional area surrounding the increasingly successful Sophia-Antipolis science park area. A collective organisation responsible for the development of the Science Park at Sophia Antipolis (SYMIVAL) was established in 1974. The number of participating municipalities grew until 1990, as the size and scope of the impacts of the park also grew. SYMIVAL's name was changed in 1996 to SYMISA, reflecting the fact that whilst in 1974, the place was identified with Valbonne, by 1996, Sophia-Antipolis had a distinct enough reputation to warrant the collaborative organisation bearing its name. Likewise, in 2002, an Urban Authority for Sophia Antipolis was established (CASA), reflecting the fact that the science park had grown to such an extent and generated such associated benefits that it required its own planning and management.

Triggering RIS building during a slow decline

The automotive sector in Piedmont has been under pressure in Italy from the 1980s, when a deep European recession reduced demand for consumer goods such as cars. From 1993, the Single European Market both exposed auto manufacturers to intense competition from European competitors, as well as eliminating the possibilities for national governments to subsidise these firms. From the 1990s, the collapse of the COMECON system and the opening up of Eastern Europe created new possibilities for outsourcing manufacturing activities to much lower-cost neighbours. The emergence of India and China in the early 2000s has created a new generation of automotive competitors with indigenous design as well as manufacturing capabilities. This story is not just true for the automotive sector but certainly for engineering – and to a lesser degree, for pharmaceuticals and aerospace.

These problems did not lead to a concerted regional response in Piedmont. Many regions have decided to develop "innovation" policies as a opposed to targeting inward investment or employment creation in existing businesses in response to a belief that these policies have failed. Some of the most impressive examples of moving to innovation policies have been in regions which have undergone a clear, deep regional crisis. In Scania, in Southern Sweden, the collapse of shipbuilding in the late 1970s led the regional governor to lobby for a science park and for Ericsson to locate its mobile companies division there, which later became the European arm of the phone manufacturer Sony Ericsson. In the North East of England, in the late 1990s, the closure of a number of flagship electronics factories created a realisation that inward investment on its own would never be sufficient to upgrade the region's weak industrial base, and has led a decade-long search for an effective science and innovation policy.

Crises are useful in building in the minds of regional actors a realisation that something must be done differently. Where there are no such crises, regional industrial policies can become "locked-in" to supporting outdated and uncompetitive industries. Direct subsidy from regional authorities to these sectors is now uncommon in advanced economies (and largely outlawed in the European Union through the State Aid regulations). However, both policy makers and these old industries can develop a shared interest in masking direct subsidies to the industries as innovation support tools, particularly where there is a strong emotional attachment to those industries.

The difficulty is in disentangling what, under these circumstances, counts as innovation support and what counts as state aid. There *are* examples of new industries which have emerged out of old subsidised sectors, notably environmental management industries from the coal sector

in Nord-Pas-de-Calais and Nordrhein-Westfalen (Hospers, 2004; Liefooghe, 2005). The risk can be that an interest group emerges out of the old industrial sectors in which direct subsidies are presented as "innovation support". The key to avoiding that risk is in building a strong culture of evidence-based decision making with rigorous evaluation at all stages of the process, involving external experts to suggest best practice and provide peer review.

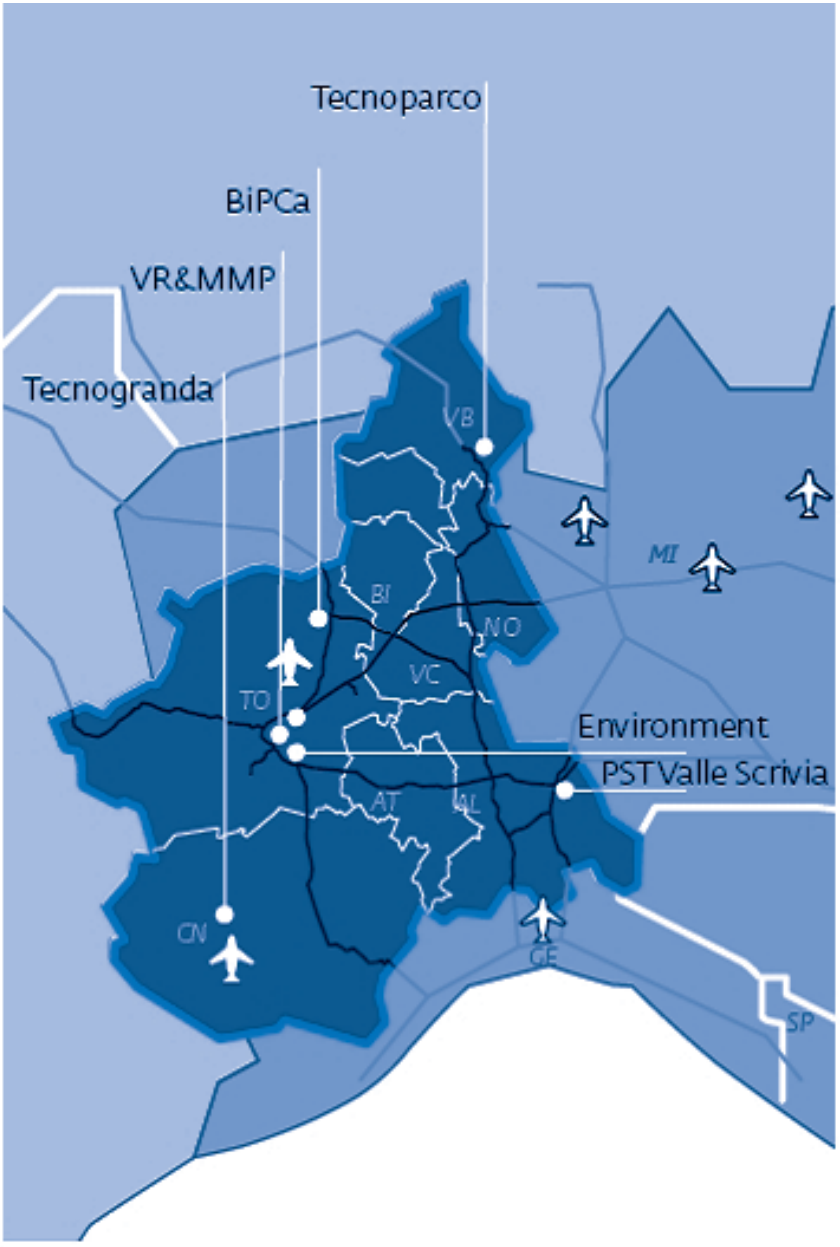
The evidence of failure in Piedmont is much more ambivalent: the restructuring of the region has been comparatively slow – although it has also been remarkably consistent. One approach that has been used successfully in other regions has been to create a synthetic sense of crisis or a failure of legitimacy of existing industrial policy. In the region of Tampere, Finland, for example, on a number of occasions, regional politicians used traditional rivalry with the nearby city-region of Oulo to encourage collective action. When Oulo opened a science park in 1986, for example, the sense of collective failure this provoked was enough to mobilise a coalition of regional actors who quickly responded by opening a science park in Tampere linked to the Regional Technical University by 1989.

The region is not the only important sub-national scale in Italy

Piedmont is not a homogenous region, and certainly there are wide sub-regional variations in the capacity to benefit from innovation policy. The heart of Piedmont is the Turin city region, which exercises significant pull over municipalities in at least four neighbouring provinces. The city of Cuneo, south of Turin, has very strong agro-food, tourism and engineering sectors, and forms the western growth axis for the region. However, much of the east of the region is outside Turin's metropolitan sphere of influence: Verbania in the north-east is a genuinely remote rural border region in the Italian Lake district; Novara in the east is just 50 km from Milan and falls more under this city's influence, whilst Alessandria lies to the south of a secondary economic axis running from Novara to Genoa on the Ligurian coast.

These regional contrasts have been inexpertly managed in the preceding decade. The way that regional inequality was addressed in the 1990s was to ensure that everywhere stood to gain something from innovation policy. A good example of this is with the way that Piedmont's science parks were created using the European structural funds. Regional agreement was achieved by ensuring that every part of the sub-region had its own science park (with the exception of the mid-east of the region around Novara). The first of the parks was the Tecnoparco, created in the Lakes region to the north.

Figure 3.2. **The science parks of Piedmont**



Source: Finpiemonte Background Report (2008).

This science park example highlights the weaknesses and also the strengths of Piedmont. The science parks are arguably not located where they would optimally be to best support the region's industrial base. This is itself a consequence of ensuring that all the sub-regions benefited from the innovation expenditure, rather than targeting it where it would have the most effect. Nevertheless, the system of science parks has been reformed rationally. The science parks had been established as property management companies that also attempted to do incubation and technology transfer. In trying to balance these core tasks, there was much learning about effective support for high-technology SMEs. This model was then expanded to a new science park in the Cuneo province to support the agro-food sector.

Box 3.3. **Concentrating expertise and diffusing knowledge: the case of XPACT**

This sub-regional problem is quite common in many successful, innovative regions. A good example of this is Barcelona and Catalonia, which is in many ways very similar to Piedmont, with a world-class city supporting a more remote hinterland with its own economic structure and specialities. The Catalan Innovation and Internationalisation system has been recently newly organised: it is prompted by the Ministry of Innovation, Universities and Enterprises, through a "General Directorate of Innovation and Internationalisation" which includes two specialised agencies, namely COPCA (Consortium for the Commercial Promotion of Catalonia) and CIDEM (Centre for Innovation and Business Development). The General Directorate is a transitional structure that leads the integration process of COPCA and CIDEM.

The R&D and Innovation policy of the Government of Catalonia is promoted and co-ordinated by the Inter-ministerial Council for Research and Technological Innovation and executed mainly by the Regional Ministry of Innovation, Universities and Enterprise. The Ministry is responsible for the management, planning and implementation of all functions related to universities and academic research as well as promotion of Innovation and Research policy. Its policy is implemented through the Commission of Universities and Research, which is responsible for the management, planning and implementation of all functions related to universities and research, and through the CIDEM (Centre for Innovation and Business Development).

The Network of Science and Technology Parks of Catalonia (Xarxa de Parcs Científics i Tecnològics de Catalunya – XPCAT) was created as a means to ensure that support for successful innovation in Catalonia did not reinforce the division between Barcelona and its hinterland. The expertise developed in university science parks around Barcelona (notably Autonomous University of Barcelona (UAB) Research Park) has been bundled into a general model and used to create science parks in the outlying cities of Girona, Tarragona and Lleida. This has effectively finessed the issue, avoiding just investing in excellence (in core urban areas) or spreading investment too thinly (across the region) by extending excellence across the region through a networked science park model.

Critical issues for the post-2005 strategy

A first-cut analysis of the changes introduced in Piedmont after 2005 are that they appear entirely sensible. However, the challenge for the region is not – as already noted – that of dealing with a crisis, or trying to build new innovation capacity in a region. Piedmont faces the challenge of making systemic improvements in a region which already performs reasonably well. That success hides the opportunity costs involved in the current arrangements and makes a radical change of the kind envisaged in the 2006 Law seem less appetising.

This encapsulates the challenge for Piedmont – it is so strongly locked into its current trajectory that a small policy of EUR 90 million annually for three years seems far too small to address the challenges at hand, such as fragmentation between regional actors, an opportunistic innovation culture, and a population rather poorly educated for the knowledge economy. At the same time, the experience of the Winter Olympic Games hints that small changes can also act as a foundation for more comprehensive region-wide shifts.

The key question is therefore: have the changes begun to act as a foundation for building an effective innovation culture, or are the existing barriers resistant to even a three year multi-million euro project? Of more general interest beyond the Piedmont case study are the questions:

- What has been done which has made interventions more successful as foundations for cultural shifts?
- What has been done which has been ineffective at addressing existing regional barriers?

This allows the case of Piedmont in its wider context to be a useful laboratory for the study of the implementation of innovation policy in regions undergoing economic restructuring.

Changing regional trajectories can only be observed with any accuracy long after the event. The challenge is to understand what indications of changing direction of travel are currently visible. Where are the unresolved ambiguities between the changes made in the current policy cycle and the wider regional context? These questions will be answered with by reference to a detailed examination of innovation activities in Piedmont.

The fit of the approach to the regional innovation culture

The first critical issue is "how well does the approach chosen match to the innovation culture of Piedmont?" The Regional Law proposes a re-ordering and regulation of innovation actors rather than any large-scale creation of new innovative agencies or partnerships. This approach carries the presumption that the current agencies are already good at innovation, and what is necessary is to encourage more organisations to behave in that way. The speed at which the changes were imposed means that they are not the result of a rational system management process, but based on inherited wisdom about the organisation of the regional innovation system. The effectiveness of the approach depends to some extent on how true these assumptions have been found to be.

- How effective are current understandings of the Piedmont RIS on which the new arrangements have been based, and is the overall approach chosen suitable given the region's context and challenges?

The rapid progress made by the Region in establishing a law, plan, fund and committees is explicable in terms of the political shift which the 2005 election marked. A new government enjoyed significant political capital and the new approach stimulated enthusiasm amongst regional partners. However, building a regional innovation system is a long-term process, and initial enthusiasm is rarely sufficient to ensure that early good intentions are translated into sustainable practices. Piedmont has recognised the need to normalise a culture of evaluation around innovation, and to mainstream innovation as something for promotion across government. The effectiveness of the new approach depends on being able therefore to sustain and convert this early enthusiasm into a capacity for delivery, and ultimately into effective innovation outcomes.

- How successful has the new set of institutional and juridical changes been in precipitating a wider change in the Piedmont innovation culture, and what are the prospects that these cultural changes will ensure the long-term sustainability of innovation policy beyond the initial period of enthusiasm?

Imposing arrangements on existing technology transfer systems

The diagnosis of the incoming Regional Government was that there was insufficient high-level decision making and priority setting around regional innovation activities with a resultant loss of focus and diffusion of impact. The response has been to impose at least two new levels of management on the system, to operate an investment programme which draws existing activities into a coherent system. There has been no consideration of how to

deal with actors which cannot be brought into line with the strategic lines of the programme. What is particularly uncertain is how decision makers will respond if successful innovators refuse to adopt the new principles of the innovation plan. Either capitulation by the Regional Government or forcing a successful institution into closure are both negative indicators towards the effectiveness of the efforts to make regional innovation in Piedmont more systemic.

- Has the new institutional arrangement been able to bring a very diffuse and incoherent set of innovation support actors into control and create a streamlined innovation system based on rational asset development?

In regional innovation systems, it is the recipients of state funding (support organisations and firms) who understand the business of innovation and innovation support. This means that innovation agencies can have a very strong position, and behave opportunistically to benefit themselves at the expense of the policy. This creates problems in devising innovation strategies – striking a balance between drawing on the expertise of existing innovation actors without allowing them to dominate that process.

Piedmont has made much of its use of external experts and effective evaluation to ensure that "interest capture" is avoided. The effectiveness of the new approach to innovation will depend on how the strategy and its implementation at every stage are able to blend detailed knowledge concerning innovation in Piedmont with a dispassionate assessment and representation of the "regional interest".

- Have the new arrangements effectively consolidated the existing networks, partnerships and organisations, and used their expertise and tacit knowledge about the business of innovation in Piedmont without leaving the new arrangements open to capture by strong/powerful actors?

The devil of the detail – implementation experiences to date?

The case of the Winter Olympics Games demonstrated the value of successfully delivered projects in achieving wider goals. Turin 2006 made clear that targeted investments in particular places could bring wider regional benefits, and helped encourage a more co-operative and less isolated approach to investment. There are already science parks and Technology Platforms in Piedmont, and to some extent, success hinges on how they contribute to improving the impact of existing instruments and interventions.

It is not yet clear whether what is being promoted under the plan are the kinds of instruments and projects that will achieve widespread regional support. The effectiveness of the new approach is in part dependent upon local perceptions of the value of particular interventions, with reference both to their own needs as innovators as well as the kinds of barriers and gaps that already exist within the regional innovation system.

- Which types of implementation approaches and instruments have been chosen, do they map effectively to existing gaps within the regional innovation system, and have they been transferred into Piedmont in a way that is sensitive to the underlying contextual conditions? What lessons are there to be learned from similar kinds of places that have had to go through this learning experience?

The approach chosen will also succeed or fail on whether particular activities are regarded by key external actors as having improved the environment for innovation. The involvement of external experts as well as involvement in Italian programmes will mean that external ideas will have to be implemented in the Piedmont context. The effectiveness of the new approach hinges therefore on perceptions of success of activities being supported, and whether they are seen as having potential for future expansion.

- How have the policies, instruments and approaches been implemented, and how have local, regional, national and international actors judged their effectiveness, as best practice types to copy, as activities worthy of further support, or useful as partners within wider institutional networks?

Understanding the programme in its longer-term context.

The reality of the impact of the post-2005 changes to innovation is that they are likely to be mixed. There will be some successes, and some failures; some barriers within the RIS will be removed or ameliorated, whilst new barriers might in turn be erected. The significance of its impacts will depend on the sensitivity of regional actors to the outcomes of particular activities within the region. Piedmont has created a new regional think-tank, Rethink (*qv*) to modify the plans and programmes on a yearly basis. A clear gauge of the building success, or otherwise, of the changes will be demonstrated by how clearly regional partners are able to critically evaluate their programmes, and to constructively modify ongoing activities to preserve excellence whilst eliminating redundancy and waste.

- Has the policy and its implementation created new kinds of problems within the RIS that were not there already, and have key RIS actors been

sensitive to the needs of ensuring that there are not disproportionate disadvantages to the approach chosen?

The Research Law sets an ambitious target of building a well managed regional innovation system in Piedmont, something which is unlikely to be achieved in its entirety during the three years of the Research Plan. The regional transformation will continue after 2009, but what can be achieved after that point is in part dependent on what has already been achieved. One substantive contribution from this plan would be if there was a well-developed regional innovation observatory which understood what kinds of policies, approaches and partnerships were most suited to the Piedmont RIS, and the implications of this for any post-2009 Regional Plan Research and Innovation. The effectiveness of the 2007-09 Plan therefore hinges on the extent to which its actions are generating an open and critical community of knowledge around innovation policy in Piedmont.

- What needs to be done in the remainder of the programming period to ensure that the innovation approach maximises its success, and what might be the outlines of a second-generation Research Plan after 2009?

Notes

1 Defined as "Scientific and technological research and support for innovation in the productive sectors" (OECD, 2007b, pp. 29)

4 *http://www.regione.piemonte.it/governo/dwd/prog_gov.pdf*

5 The Italian system distinguishes between the legal status of the national ministries (which have the title *Ministero*) and the Regional Ministries (which have the title *Assessorato*).

6 In the interests of brevity, in this report the full name of the Regional Ministry is abbreviated to the "Ministry of Innovation" (*i.e.* an *Assessorato*)

7 More information about the individual actors is presented in Chapter 3 in the section relating to bridging actors in the regional innovation system.

8 "The Conference of State-Regions. The Conference of State-Regions was instituted in 1988 by Law No. 400. Its functions were enhanced by Act 59 of 1997 to allow regional governments to play a key role in the process of institutional innovation, especially relating to the transfer of functions from the centre to the regions and local authorities. Its composition includes the Prime Minister (or the Minister of Regional Affairs) as president of the Conference, the Presidents of the Regions and other ministers whenever matters related to areas of their competence are discussed. The central government consults the Conference of any legislative initiative related to areas of regional interest" (OECD, 2007b, pp. 13)

9 *http://www.regione.piemonte.it/innovazione/ricerca/sistema-ricerca/accordi.html*

10 The SESAMES project was experimental in the European sense of being an Article 10 funded project under the Trans Regional Innovation Project (TRIP) measure in 1998-2000. The success of TRIP was institutionalised into the "Regions of Knowledge" programme in which Piedmont also participated in the ERRIN network. The success of these projects were in part responsible for the shifting emphasis on trans-regional innovation projects after the withdrawal of Structural Funds from Western regions after 2013. Thus Piedmont can fairly claim to have participated in the earliest experiments in trans-national regional innovation strategies.

Chapter 4

The Regional Innovation Institutions

In the previous chapter, the implementation of the Regional Research Law (04/2006) was set out and contextualised within Piedmont's long-term economic development trajectory. This law and the intentions of its promoting politicians has been to build a regional innovation system in the region. This ambition reflects more general recent developments in understanding the drivers of economic growth and competitiveness within increasingly globalised contexts. RIS policies are those that seek to encourage and improve the interaction between those involved in innovation within particular regions.

Latest research around RISs emphasises that systemic approaches to innovation policy run the risk of focusing on large, visible structures, rather than the small and medium sized firms who are ultimately the target for innovation policy. It has therefore become increasingly common to speak of innovation ecologies. The implications for policy are to target creating supportive environments for innovation where businesses can more easily access the resources necessary to successfully compete through innovation. Understanding the environment requires understanding these small scale environments where innovation takes place, the networks, clusters and incubator centres, as much as the policies and institutions which support them.

This chapter provides a systemic overview of the situation within Piedmont. The first section provides an outline of the concept of the regional innovation system as a means of understanding and improving regional innovation performance. The second section provides a taxonomy of the institutions in Piedmont, and explores how comprehensively they interact to support innovation. The third section identifies the key weaknesses within the RIS which the law is seeking to address as the basis for understanding how the new initiatives since 2005 are influencing the region's RIS.

A typology of institutions within RISs

The emergence of the idea of a regional innovation system

The idea of the regional innovation system emerged in the 1990s with the increasing realisation of the importance of "place" to competitiveness (Morgan, 1997). Regional characteristics were identified as significant elements of the competitive success of particular local production systems, industrial districts, learning regions and competitive clusters (Lagendijk & Cornford, 2000). These characteristics were not purely economic, but also included local institutions promoting economic development. Institutional arrangements such as the Real Services Centre and ERVET in Emilia-Romagna, or Frauenhofer in Baden-Wurttemburg were proposed as "ideal type" for regional competitive success (Cooke *et al.*, 2003).

These institutions supported economic success by encouraging systemic relationships between actors within a locality, leading to the idea of the regional innovation system. Regional innovation performance (and hence regional economic performance) could be increased by improving the efficiency with which partners interacted, and by systematising their relationships into institutions which supported their interactions. Local context was very important at influencing which kinds of institution would succeed, and there has been much criticism of institutions transferred uncritically between regions without adequate consideration of how these "ideal types" would fit with what already existed.

The emergence of the idea of "regional innovation system" as an academic subject cannot be divorced from the concurrent policy developments. If the National Innovation System (NIS) idea benefited from the OECD's role as promoter, then the RIS idea also benefited from such a strong promoter, namely the Regional Policy Directorate (DG XVI) of the European Commission. Regional policy continually faces the risk of being seen as a compensation package for failure rather than investing in success, and particularly under tightening financial situations, is easily neglected. Regional innovation policy provided a means to resolve this tension, and to recast policy measures as investing in the potential of less successful places by boosting their innovative capacity.

Innovation policy is now a central component of European regional policy. This is as true for Piedmont as for other regions. In Piedmont's Structural Funds programme 2007-13, EUR 500 million are to be invested in innovation support activities, more than matching the funding of the Regional Research Plan. The case for support for these policies has to be made in terms of filling gaps in the regional innovation system; identifying

those gaps and developing policies follows a precisely determined process involving stakeholder consultation, strategy development, pilot initiative development and mainstreaming.

The roles of actors in a regional innovation system

A useful distinction can be made in identifying the central relationship within a regional innovation system (RIS) existing between two main groups of actors, what Cooke & Piccaluga refer to as sub-systems (Cooke & Piccaluga, 2005). These are the knowledge-generation and the knowledge exploitation sub-systems. Both of these sub-systems can be regarded as nodes within much wider – global – networks.

- Knowledge-generators produce new knowledge within networks of corporate, academic and public research activity which inevitably extend beyond a single region.
- Knowledge utilisers exploit that knowledge by creating competitive advantage in global production networks, creating new competitive products which can be profitably traded.

It is important to stress that this division is conceptual, and particular actors' roles are not fixed. Because innovation is not a linear process, one actor may perform different roles at different points in time, such as a corporate research laboratory (knowledge generator) which may also become involved in prototype and pilot manufacturing (knowledge utilising functions). The value of the distinction lies in linking innovation activities (value creating) within a region to the larger networks which are drawn on in realising that value added. The topology, dynamics, processes and motivations of those networks are very different for knowledge producers and knowledge exploiters, and making this distinction allows a better understanding of *how* these actors contribute to regional economic performance.

Well-functioning RISs can be regarded as having a virtuous interplay at the local level between these two global networks. Firms invest in places to access the knowledge pool which exists, not just the patents and licenses but the talent, human capital and tacit knowledge held in people. These investments stimulate the local economy as well as financing the development of new knowledge within the knowledge generators of a region. However, these two sub-systems are not the only groups which influence how supportive the place is for innovating businesses.

There are two other groups of actors which influence this, namely intermediary organisations and regulatory institutions. Intermediary organisations facilitate relationships between the knowledge generation and knowledge utilisation sub-system. They may be deliberately created to fill a perceived gap in the RIS, or they may evolve to regularise and facilitate repeated interactions between particular groups of actors. Intermediary organisations take a number of different forms depending on the way they fill the gap in the RIS:

- **Bridging the "gap"**: Many "model" regional innovation institutions build relationships and position themselves between the two sub-systems to valorise knowledge, such as ERVET or Frauenhofer.
- **Subsidising experimental interactions**: Innovation support organisations can also intermediate by providing subsidies for experimental interactions between the two sectors, such as the now ubiquitous university technology transfer office, or the Dutch SME Innovation Voucher scheme.
- **Mobilising collective demand**: This work with existing and new firm networks to identify common knowledge needs and support subsidy seeking to buy in the appropriate knowledge from local providers; many clustering organisations play this role.
- **Direct brokerage**: These centres have knowledge about local firms and universities and link between the two on a case-by-case basis. Knowledge House in the North East of England is a university-supported service helping firms to access university knowledge.

Not included in this sub-system are institutions which solely provide innovation support services such as patenting advice, rapid prototyping, CAD services or training. Finance and venture capital services are included where the capital is used by a new small firm to develop linkages with knowledge generators which assist with the innovation process.

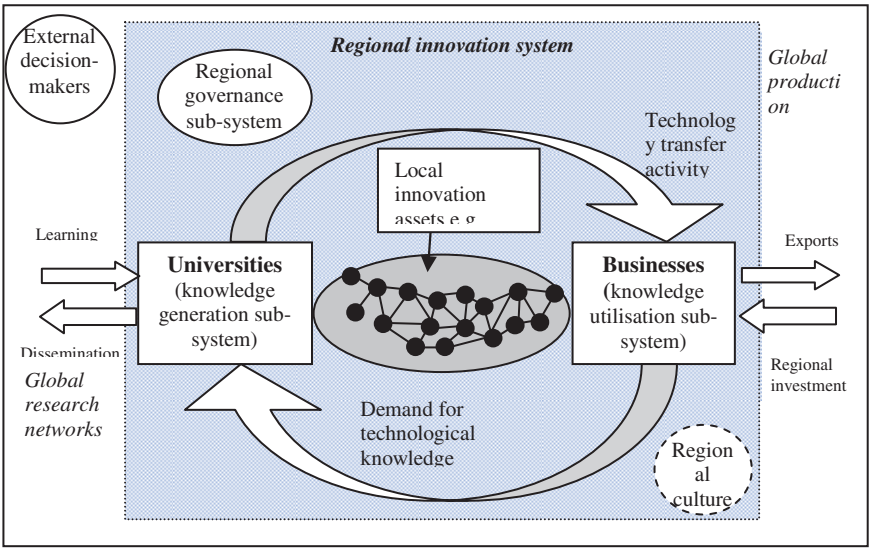
A final set of actors are decision makers who influence the "rules of the game" by which the system operates, the regional governance sub-system. RISs are always nested within wider sets of relationships – knowledge generators and utilisers are nodes within global research and production networks. Likewise, national, European, multilateral and international regulation and decisions influence the autonomy of local decision makers. But local decision makers are critically important in shaping the qualitative development of a RIS, particularly in places where they are believed to be locked in to old and uncompetitive industries and habits. This sub-system exerts influence on the other sub-systems through a variety of mechanisms.

- **Direct support**: providing direct subsidies to particular actors or sub-systems within a range of policy fields.
- **Priority setting**: deciding which kinds of sectors offer the best prospects for the region and targeting support on those sectors.
- **Building critical mass**: joining up smaller activities and investments into strategic projects which bring more supporters into the innovation community.
- **Initiating change**: they can announce the decision to shift the policy paradigm towards innovation led policies in order to change the regional culture.
- **Regulating policy process**: by insisting on evaluation, peer review and use of experts, they influence *how* instruments are implemented in practice.

RISs are very place-specific, and their operation is influenced by the prevailing innovation culture. This regional "style" of innovation shapes common and shared assumptions about how problems are to be solved, and what are appropriate types of behaviour under particular circumstances (Lundvall, 1998). The Netherlands has a highly innovative civil engineering consultancy sector whose success cannot be divorced from the daily experience of engineers in maintaining the country's water protection infrastructure. This is driven by the urgency underwritten by the 1953 flooding disaster, as well as the relatively frequent occurrence of extreme flooding. The institutional arrangement in the Netherlands reflects all these socio-cultural factors, and provides a competitive innovative advantage not easily replicated elsewhere (Manshanden *et al.*, 2002).

A RIS approach seeks to map the actors in this system, understand how they are interacting, and identify how policy measures can improve the interaction between them, recognising that improving interaction is a dynamic process and not simple. Improved interaction between the regional sub-systems helps to improve the overall level of innovation that takes place regionally, and to ensure that regional economic growth is driven by increasing productivity levels and business productivity levels. Although the focus of the RIS analysis is on elements of a system, the economic benefits from this system are produced by the firms operating in networks and supply chains who use innovation to compete more effectively. Innovation policy therefore seeks to improve this business competitiveness.

Figure 4.1. **The regional innovation system as a local circulation between globally-connected regional innovators**



Source: Adapted from Cooke & Piccaluga (2004), *Regional Economies as Knowledge Laboratories*, Edward Elgar, Cheltenham.

A taxonomy of the Piedmont RIS

The regional innovation system in Piedmont is very highly developed, with a large number of actors active in supporting innovation activities which are primarily concentrated in four or five main industrial sectors, and primarily in large firms. There is a relatively low level of co-ordination in this RIS at a variety of scales, in part related to the fact that the large firms historically co-ordinated new product development. These large firms led developments in the regional innovation system through their supply chains; elements of this activity are increasingly offshore, disconnecting local SMEs from one strong innovation driver.

There are far fewer contemporary strong co-ordinating actors, and there is no strong set of firms demanding innovation support which have guided the development of the innovation system. Rather, new organisations have tended to emerge in quite a piecemeal way, often created spontaneously by particular actors seeking to address a particular problem. These actors have not always been well informed about the other opportunities and capacities within the regional innovation system, and have often been restricted to their

own institutional concerns. This has meant that there are many, independent and unco-ordinated activities in the region and competence in innovation support is diffused widely across these wide-ranging activities.

External influences

The two key external influences on the Piedmont innovation system come through the national and European systems within which it is embedded. The European influence on the Piedmont's RIS does not produce fully identifiable systemic effects, but there are a range of policy fields which are salient here. Piedmont is well involved in European Research Framework programmes, receives significant structural funds and is involved in a number of networking activities. The Italian National Innovation System is much more influential for Piedmont, because it determines some of the funding instruments which support regional activity.

The regional impacts of European policies

Because of the relatively small size of European budgets (1.24% of EU GDP) in comparison with the resources available to national and sub national governance levels, they have increasingly been concentrated behind activities which can deliver core European "agendas". There are two main European policy domains which have salience for the European Union in the coming years; the first is the delivery of the Lisbon Agenda.

This declaration, which was ratified by the Italian Parliament in July 2008, commits to making Europe "the most dynamic and competitive knowledge based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion, and respect for the environment, by 2010". National ratification commits member states to align their national policies in an identifiable and transparent way around the delivery of these two main goals. The second is the Bologna declaration around the creation of a single European higher education system. Given perennial Italian problems with a "brain drain" of its researchers and students, the Bologna agenda has the potential to help open up Piedmont's Higher Education Institutes (HEIs) to a higher throughput of international students, and help the internationalisation of the region from within. Given the critical role which HEIs have played in the development of technology transfer and knowledge transfer activities within Piedmont, Bologna has the potential to contribute significantly to a revitalisation of the region's knowledge generation system.

There are two primary areas of European Policy salient to the Piedmont's RIS, namely research policy and regional policy. Both these

policies represent significant policy and expenditure areas for European policy, and have relatively significant and increasing impacts for this region. European science policy seeks to create critical mass in European research excellence as a platform for competitive commercialisation and innovation.

The Framework Programme sets the basis for public investment in the science base, and seeks to achieve two main goals:

- to strengthen the scientific and technological base of European industry;
- to encourage its international competitiveness, while promoting research that supports EU policies.

The seventh Framework programme involves EUR 50 billion of public resources over seven years, and represents a 41% real terms increase in the resources for the predecessor 6th Framework Programme. All activities must have a demonstrable "European added value" and clearly demonstrate how they contribute to European scientific excellence. Roughly two thirds of the resources are invested in actions promoting co-operation through research networks and collaborative research activities. Frontier research is being supported through the creation of a new European Research Council (EUR 7 billion), there is a strand encouraging researcher mobility and idea exchange (EUR 5 billion) and investment in research and innovation capacity (EUR 4 billion).

Piedmont has a relatively strong scientific infrastructure and this is reflected in the number of projects in which it is participating under the Framework programme. As the seventh Framework is currently underway, participation data is incomplete but data from the 6th Framework programme shows that Piedmont is well represented in Italian Framework Programme Participation. A breakdown of this participation is detailed below in Table 4.1 by Framework programme thematic area.

Piedmont has a good track record in using European funds to create local institutions supporting participation in trans-national research networks. The region has become involved with the MANUNET trans-national co-operative network. This is part of the ERANet programme, in which the EU funds institutions which encourage SMEs in manufacturing to participate in EU funding programmes. MANUNET was established under FP6, and is seeking to extend under FP7. Piedmont is seeking to use this existing platform with its established network connections to help address the problem of the long-tail of non-innovating SMEs in the region.

Table 4.1. **Piedmont's participation in the European research framework programme**

Thematic area	Bids		Awards	
	No.	% Italy	No.	% Italy
Technologies for the information society	704	12.7	159	14.7
Nanotechnologies and nanosciences	325	12.6	124	25.6
Sustainable development	303	12.6	96	15.9
Aeronautics and space	105	12.6	62	21.5
Specific activities for SMEs	452	12.6	24	5.0
Life sciences	173	12.6	17	3.9
Innovation and research	76	12.5	14	6.8
Research for the research policies support	177	12.6	12	7.2
Safety and quality of food products	120	12.6	9	4.4
Citizens and governance in the knowledge society	84	12.5	9	7.7
Support to international co-operation	252	12.7	7	6.5
Co-ordination of research activities	26	12.4	1	5.9
Euratom	24	10.8	1	2.3
Total	**821**	**12.6**	**535**	**12.6**

Source: Unioncamere Piemonte (2007), cited in Finpiemonte Background Report (2007).

A second action within the Framework Programme in which the region has been involved is the "Regions of Knowledge" measure. "Regions of Knowledge" funds regional coalitions of innovative actors to work together and share best practice with other European regions to improve their own systemic innovation management. Piedmont is involved with the CREATE partnership.

The Structural Funds have become an increasingly influential source of support for Piedmont in recent years. The region was eligible from 1994 to 1999 for funding under objectives 2 and 5b, the measures relating to rural development and for declining industrial regions. In 2000-06, Piedmont was eligible for objective 2 (competitiveness and innovation funding), and for the period 2007-13, the region receives phasing out funding for innovation. The Structural Funds were very important in the late 1990s and early 2000s in the absence of regional resources for innovation promotion. They funded large numbers of experimental activities which were subsequently extended or enlarged – a number of these activities have become key actors in the Piedmont RIS.

The notional total resources made available under the 2000-06 programme was EUR 2.7 billion, which included EU, other public and private contributions. The breakdown of the resources during this period is shown in Table 4.2 below. There were four priority areas for the 2000-06 programme, covering internationalisation, qualification and support to the economic system, local territorial development and valorisation, and social cohesion.

Table 4.2. **Public allocations to the structural programme for Piedmont, 2000-06**

Total resources	ERDF	Local co-funding	Private resources
EUR 2.713 bn	EUR 509.8 m	EUR 737.2 m	EUR 1.466 bn

Source: *Regione Piemonte* (2007). *Dal Docup al Por Fesr. Vademecum*. November 2007.

This programme covered all areas of innovation policy with the exception of basic research, which remained the exclusive competence of the national state. In this programming period, the emphasis was primarily on supporting knowledge transfer and technology transfer, with a certain amount of horizontal stimulation around the field of digital media technologies. The main activities funded under this round included:

- 2.1.b funds for investments of firms;
- 2.3 completion and development of structures for the economic system (technological intermediaries, services for firms, science parks, industrial areas, etc.);
- 2.4.a applied research (sustaining the DIADI project);
- 2.4.b support for the realisation of an information society;
- 2.4.c support for e-business;
- 2.6.b incentives to SMEs for research projects;
- 3.4 support for economic activity (only from 2005).

The latest (and ultimately final) ERDF programme for Piedmont is strongly aligned with the regional priorities for innovation set out in the regional innovation plan. Table 4.3 sets out the allocations under the region's four priority areas, including EUR 37 million total funding for technical assistance which will be oriented towards embedding innovation cultures within regional organisations. A number of the activities of the Regional Research Plan are being funded through this programme, including Innovation Platforms, innovative clusters and research on advanced production systems (under priority 1) and research on sustainability and energy efficiency (under priority 2).

Table 4.3. **Public allocations to the structural programme for Piedmont, 2007-13**

Priority	EU Contribution	National/regional Contribution	Total Public Contribution
1. Innovation and Production Transition	197 037 574	300 947 922	497 985 496
2. Sustainability and Energy Efficiency	107 083 786	163 555 824	270 639 610
3. Territorial Development	107 083 786	163 555 824	270 639 610
4. Technical Assistance	14 914 176	22 779 363	37 693 539
TOTAL	426 119 322	650 838 933	1 076 958 255

Source: Regione Piemonte (2007). *Dal Docup al Por Fesr. Vademecum.* November 2007.

The final area where European policies and resources have influenced regional activities has been through policies supporting network activities. Piedmont was involved in the trans-national co-operative network The European Regions Research and Innovation (ERRIN). ERRIN is designed to help regional actors participate fully and effectively in the European Research Area. The network currently has 53 members, which are all regional actors. ERRIN aimed at providing a set of research and innovation initiatives to support sustainable regional development. ERINN encompassed five main activities, EU-wide co-ordination, trans-national knowledge exchange, practitioner development, policy and thematic development and knowledge exchange.

The national innovation system

A national innovation system does not merely comprise all the activities, policies and instruments which national governments introduce in the field of innovation policy. There are also a range of regulatory, financial and planning decisions taken by national government that shape the environment for innovation. The impacts of these decisions are not uniform across regions, and can shape regional innovation systems in unpredictable ways. A recent OECD country review highlighted that the central issue in the field of Italian economic development was its falling rates of knowledge capital accumulation, and the diminishing levels of productivity growth attributable to Total Factor Productivity (intangible capital). Since 1992 (1992-2006), TFP productivity growth has been negative for all private sector and for business services, which is a very worrying trend (Bassanetti and Zollino, 2007).

The national state's response to this has been to deregulate national markets, to increase competition as a stimulus for greater investment in and exploitation of knowledge capital investment. This deregulation process has overshadowed all other economic policies, particularly given the strong budgetary squeeze that Italy has faced since the early 1990s. This has arisen

from efforts to meet firstly the Maastricht single currency criteria, and more latterly, the public budgetary elements of the Growth and Stability Pact. This is driven by the National Reform Plan which seeks to reshape Italy's basic governmental structures and approach to regulation to create a national administrative culture more conducive to and supportive of innovation.

The Italian national state has sole competence for activities in the field of basic research and so national decisions in the field of research play a strongly influential role in the evolving regional innovation system. The national government also has an interest in innovation policy through the valorisation and exploitation of these investments in knowledge capital.

There have been three main strands to Italian national innovation policy in recent years (OECD, 2007b):

- **Systematic and strategic investments**. The government has sought to increase traditionally low levels of investment in R&D in a focused and responsible manner. The novelty of these kinds of investment has led to the adoption of a national strategy for R&D policy, ensuring that investments are co-ordinated and directed towards addressing poor national R&D performance.
- **Selection of key priority areas**. Much emphasis has been placed on identifying the priority sectors towards which innovation funding is to be selectively directed, and on novel instruments to help build critical mass and global strength in emerging strategic areas, sectors and poles. These key sectors must be those with a capacity to drive transformation and modernisation across the Italian economy.
- **Promoting interaction between innovators**. The Italian system is characterised by innovation within SMEs that have relatively few connections to universities, research centres and the banking system. The government aims to improve valorisation by stimulating partnerships between knowledge generators and knowledge exploiters along with those that can help with interaction, knowledge transfer and strategic co-ordination between the sectors.

Piedmont's decision to increase its systemic approach to innovation is strongly aligned therefore with both European and national trends. There is increasing pressure within EU structural funds to use those funds to systematically target innovation promotion towards the achievement of the Lisbon target of 3% investment of R&D in GDP across European regions. The Italian government has targeted a systemic approach to innovation, in part to deliver Italy's contribution to the Lisbon agenda.

The Italian government has elaborated a national Research Plan which sets out national level policy objectives and the strategic lines of action. The National Research Plan is a top-level governmental strategy document which complements both the national reform programme and also the recently approved "*Industria 2015*" plan for economic development. Resources for the National Research Plan are supplied through the national budgetary law. The national Research Plan runs from 2005 to 2007 and has three main strategic lines of action:

- "reinforcement of the scientific base of the country, looking for excellence, merit, internationalisation, economic growth and valorisation of human capital;
- strengthening the technological level of the Italian productive system to maintain competitiveness, focusing on 10 strategic industrial research programmes, also involving the participation of universities and research centres;
- supporting active participation in EU programmes and in international agreements."

One of the priorities of the National Research Plan (2005-2007), approved in March 2005, is the promotion of 'the capacities of SMEs to innovate processes and products and form clusters at local regional areas. This fits with the competence of the Italian government to promote balanced regional development across the country as a whole.

In order to enhance the competitiveness of the regions, technology districts in key sectors are being jointly promoted by the government together with the regions, as territorial entities which are systemically grouped and characterised by technology intensive products and services – 24 technology districts have been promoted so far in key strategic areas (23 approved, one pending):

Out of the 25 technology districts initially promoted, only seven are already functioning, namely Wireless applications (Piedmont), Nanotechnologies (Veneto), Mechatronics (Emilia-Romagna), Aerospace technologies (Lazio), Molecular biomedicine (Fruili-Venezia Giulia), Polymeric materials and compounds (Campania), and Integrated smart systems (Liguria), whereas the remaining ones are in different phases of development. This information is shown in Table 4.4.

Table 4.4. **The status of the technology Ddstricts launched by MIUR.**

Currently active	Latent (pending initiation/start-up)	
Wireless applications (Piedmont)	ICT (Lombardy),	Biotechnologies (Lombardy),
Aerospace technologies (Lazio),	Advanced materials (Lombardy),	Innovative technologies for seismic risks (Basilicata),
Molecular biomedicine (Fruili-Venezia Giulia),	Renewable energy and environmental technologies (Trentino),	Logistics (Calabria),
Polymeric materials and compounds (Campania),	ICT & security (Tuscany),	Cultural heritage (Calabria),
mechatronics (Emilia-Romagna)	Food security and quality (Abruzzo),	Bio-medical and health technologies (Sardinia)
Nanotechnologies (Veneto),	Agro-industry (Molise),	Naval transportation (Sicily),
Integrated smart systems (Liguria)	Agro-industry (Puglia),	Sustainable bio-agro and fishery (Sicily),
	High-tech (Puglia),	Nano-micro technologies and special materials (Umbria).
	Microelectronics (Sicily),	**Medical technologies (Puglia)**

The technology districts initiative was launched by the MIUR in 2002-03 with the initial objective of creating territorial poles of excellence for research and innovation, reinforcing technology transfer and the valorisation of SMEs' research results. During the period 2003-05, their mission shifted from the valorisation of research results to the support of industrial innovation. In addition, some of the leading technology districts have created the Technology Districts Association (ADiTe or *Associazione dei Distretti Tecnologici Italiani*) in order to improve their capacity to work in networks with the objective of accelerating technological innovation in the Italian productive system.

The knowledge generation sub-system

Universities & higher vocational training

There are four universities, the University and Polytechnic of Turin (with 65 000 and 24 000 students respectively), as well as the University of Eastern Piedmont (10 000 students) and the Gastronomic University (200 students). The two main universities are both located in Turin, and whilst the University of Turin is the larger of the two, the Polytechnic has a subject portfolio which is more closely aligned to those of business innovation, including engineering subjects. The Polytechnic also has eight campuses across the region including two in Turin as well as Alessandria, Aosta, Biella, Ivrea, Mondovì and Vercelli. The Polytechnic of Turin was

created to train engineers and others necessary to support the emerging mass production businesses in the interwar period. The University of Turin is a classic Italian HEI, formed in 1404 and offering a broad subject mix to large numbers of students.

The University of Eastern Piedmont (*Università degli Studi del Piemonte Orientale "Amedeo Avogadro"*) was formed from a number of faculties of the University of Turin which had been delocalised from Turin into the eastern Piedmont cities of Vercelli, Alessandria and Novara. In the 1990s, these cities felt that they suffered from a lack of connectivity and critical mass, and wanted a shared institution to help the eastern part of the region distinguish itself from the successful western areas. They were successful in persuading the region to provide the additional funding to create an autonomous institution from these decentralised faculties. Because the university was formed from remote departments of the University of Turin, there is no engineering faculty, although there are science departments which are closely connected to local businesses.

Table 4.5. **The public universities of Piedmont 2005-06**

	Students	Faculties	Departments
Università degli Studi di Torino	65 563	12	55
Politecnico di Torino	24 035	6	18
University 'Amedeo Avogadro'	9 743	7	12

Source: Finpiemonte Background Report (2008).

This represents a comparatively low number of HEIs given the regional population, which reflects two issues. The first is the relatively low participation rates in higher education in Italy. The second is the comparative absence of private higher education from Piedmont (the only private university being the Gastronomic University). In Italy, higher vocational education is not a university task, unlike in a number of other comparator regions.

In Table 4.6, comparative data on the numbers of institutions is given from a selection of regions participating in an OECD Institutional Management in Higher Education (IMHE) review of the regional contributions of higher education. This low number of universities does have implications for the capacity within the HE sector to act strategically and contribute to improving the strategic capacity for innovation in the region, critically around understanding the universities' regional innovation impacts. There are both strengths and weaknesses – fewer universities can find it easier to act in a concerted way, although there may be particular absent knowledge important for regional development.

Table 4.6. **The number of universities and populations of selected regions**

Region	Population (millions)	HEIs
Northern Parana, Brazil	9.6	151
Nuevo León, Mexico	4.2	42
Metropolitan Busan	3.75	26
Atlantic Canada	2.3	21
Öresund	3.5	14
Valencia	4.5	7
Twente, Netherlands	0.66	5
North East of England	2.5	5
Jutland-Funen	3	4
Trondelag, Norway	0.2	4
Piedmont	**4.2**	**3**
Jyvasklya	0.27	2
Sunshine Coast, Australia	0.4	2
Canary Islands	2	2
Varmland	0.27	1

Source: OECD (2007).

However, it is not just universities which are important to the high-level knowledge environment in Piedmont, as the region is also home to a large number of higher-level vocational and post-experience training organisations. The most important of these organisations are:

- **ETF (European Training Foundation)**, set up by the European Union, specialises in the development and reform of vocational training and know-how. It converts European policy into training and labour market tools.
- **International Labour Office International Training Centre**, the UN's international training centre in Europe. This is the European training centre for the ILO, the United Nations' agency specialised in educational activities on international labour regulations and human rights, business development, social security.
- **United Nation Staff College**, UN body based in Turin with the purpose of training the organisation's managers and directors.
- **UNICRI, United Nations Interregional Crime and Justice Research Institute**, the UN's international body for research on crime and criminal justice, organises a Master degree in Criminology and Crime Policy together with the Law Faculty of the University of Turin.

- **ESCP-EAP, European School of Management**, is Italy's second business school for top management training of international standing (after Bocconi University in Milan) offering prestigious Master, MBA and Executive programmes.

Since 1997, these organisations have collaborated through the International Pole for the Support of Education and Training.

- **SET International Pole for the Support of Education and Training**: this is a foundation set up in 1997 with the goal of giving visibility and consistency to the various initiatives run by international training institutions in Piedmont and Turin.

Private research laboratories

There is a very strong non-academic research system within Piedmont, with three mainstays. The first is the research activities of the corporate sector. There are over 200 corporate research laboratories in the region, from which is derived its comparatively high expenditure on R&D as a proportion of GDP. There are a number of large R&D laboratories which have started to adopt a more networked and collaborative approach to their research activities.

The strongest research laboratory in Piedmont remains CRF, the FIAT Group Research Laboratory. This laboratory represents one of the main providers of R&D and innovation in Europe. There is a workforce of 900 highly trained professionals within Piedmont and a portfolio of over 2 000 patents. Another significant regional R&D presence is GM Powertrain Europe Research Centre. Telecom Italia have maintained their presence in Piedmont and the region has been successful in attracting new R&D activities from, amongst others, Motorola and Microsoft.

A second important element of the non-academic research system is collaborative research laboratories. These have emerged in the last decade as public-private partnerships between businesses and universities. With the increasing interaction between businesses and the HE sector, there has been a realisation that there is a role for organisations undertaking research of interest to both the public and private sector. A good example of this is the *Istituto Superiore Mario Boella* (ISMB, involving the Polytechnic, Motorola, SKF, STMicroelectronics and Telecom Italia). The ISMB employs 250 researchers and devotes EUR 8.9 million annually to industrial focused research projects.

ISMB is located on the site of the Polytechnic and has provided an anchor tenant for the development of new kinds of research space on the university campus where businesses and academics can come together and exchange knowledge whilst undertaking research meeting their shared interests. ISMB has an annual budget of EUR 11.9 million, which is made up of a core grant from *Compagnia di San Paolo*, with half of the rest coming from consultancy, and the remainder evenly split between European and Italian public grants (ISMB, 2008). In 2008, GM Powertrain Europe Research Centre will move its European headquarters and Global Diesel Development Centre to this new "Polis" campus.

Public research laboratories

The final element of the research generation sub-system is the region's public research laboratories. A number of these are funded by the national research council (CNR), as well as independent, publicly funded research centres in nuclear physics and "energy and the environment". There is a network of CNR laboratories in Piedmont covering a number of thematic areas. The main research areas with CNR representation in Piedmont are:

- earth and environment (hydro geologic risk, advanced technologies for geo-engineering applications);
- agro-food (food quality and safety, plant pathology);
- information and communication technologies (system engineering, telecommunications);
- molecular design (polymeric materials and related textile processes);
- production systems (characterisation and working of ceramics for aerospace and health applications, and for agricultural earthmoving machines);
- cultural identity (behaviour of enterprises, socio-cultural research).

The other important non-academic research centres are the National Institute of Nuclear Physics (INFN), dedicated to the study of the fundamental components of matter, and the Italian National Agency for New Technologies, Energy and the Environment (ENEA), committed to the advancement and dissemination of knowledge and technology in the fields of energy and environmental sciences.

The knowledge exploitation sub-system

The high rates of innovation amongst Piedmont's firms reflect the sectoral structure of much of its manufacturing, in innovation-led sectors. Historically, much of this innovation has been undertaken either independently or within industrial production sectors driven by large firms. With the disappearance of these firms, there has been a fragmentation of innovation support at the same time that business innovation has become increasingly important to industrial competitiveness.

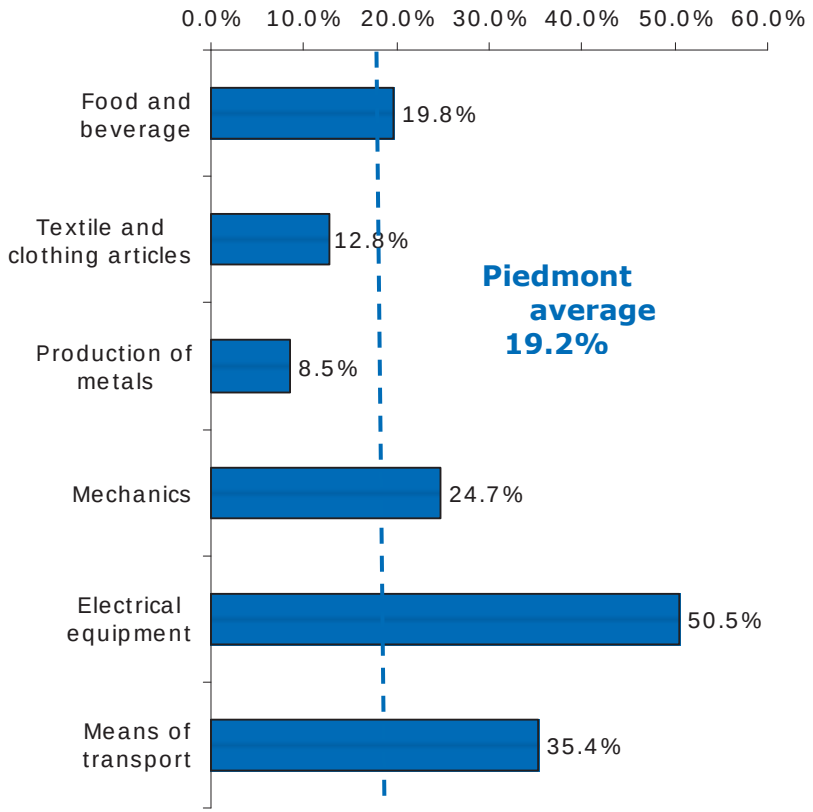
Table 4.7. **Regional firms (%) declaring innovation activities, 2005**

Vehicles & parts	26.5%
ICT	20.4%
Pharmaceuticals	16.3%
Industrial manufacturing	14.3%
Electronics	8.2%
Consumer products manufacturers	6.1%
Metals & mining	4.1%
Utilities	2.0%
Aerospace & defence	2.0%

Source: Finpiemonte Background Report (2008).

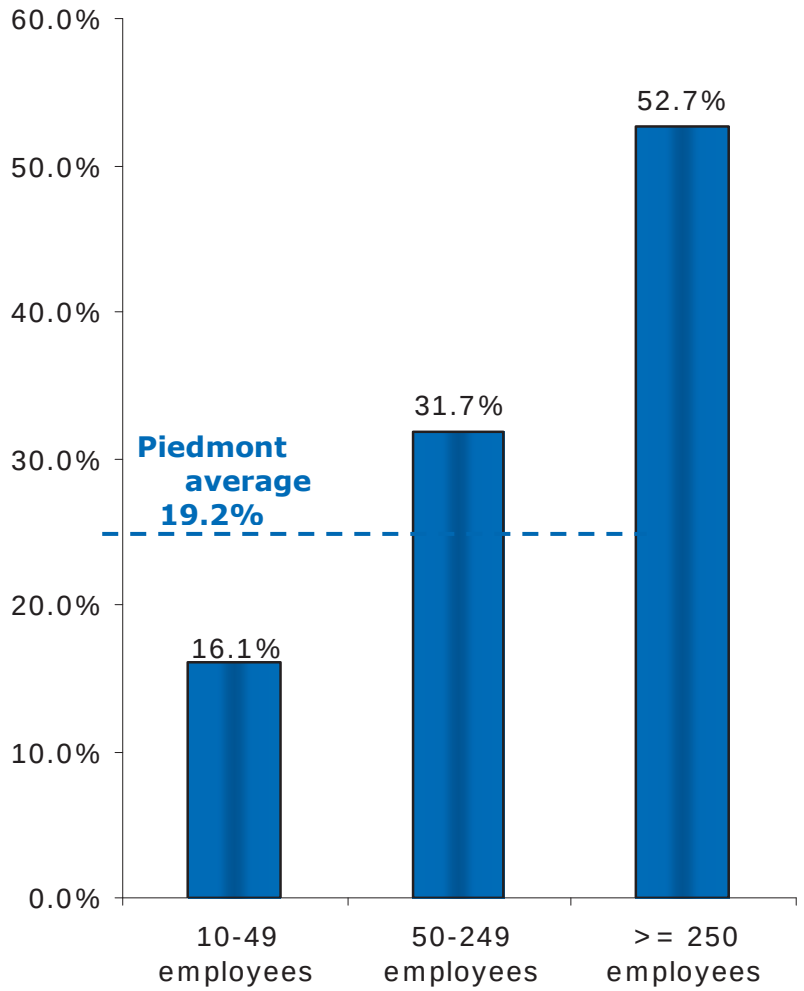
There are many innovative firms active in Piedmont, as demonstrated by Figures 4.2 and 4.3, which show the sectors where innovation is taking place, as well as the size of firms in question. Most innovation activity unsurprisingly takes place in large firms. The most innovative sectors (in terms of number of firms reporting innovative activity) are mechanical engineering, transport engineering and electrical equipment.

Figure 4.2. **Innovative activity by firms in Piedmont by sector and size (% firms reporting)**



Source: Unioncamere Piemonte, "Indagine congiunturale sull'industria manifatturiera piemontese".

Figure 4.3. **Innovative activity by firms in Piedmont by sector and size (% firms reporting)**



Source: Unioncamere Piemonte, "Indagine congiunturale sull'industria manifatturiera piemontese".

Knowledge is exploited within businesses, and new businesses are dependent on the availability of finance to be able exploit locally produced knowledge. Unlike other Italian regions, venture capital has a strong presence in Piedmont, with a range of firms including Intesa San Paolo, Unicredit, Metagroup, Fondazione CRT, and Innogest Capital. However, there seems to be an imbalance between the supply and demand sides in the region's venture capital markets. The problem is regarded as one of a dearth of suitable ventures with sufficient market potential to justify investments on commercial terms. As one venture capitalist noted:

> In the space of two years, we have invested in 5 start-ups […] We examined 100 business plans for spin-offs and chose 5: 95 had no market potential […] There is no reason for each region to have its own venture-capitalists, the critical mass is insufficient.

The issue can be regarded as one of "investor-readiness", that is to say that potential entrepreneurs have a tendency to approach venture capitalists before they are "ready" to present their ideas to investors in ways which will be seen as commercially viable. Wray (2008) highlights the importance of intermediaries in bridging this gap, and helping to resolve problems between the very different innovation networks inhabited by entrepreneurs and financiers.

The bridging sub-system

The bridging process is not a simple activity, and there are many different kinds of behaviours and contributions which fall together under general description of bridging. Not all institutions will play a single bridging role, and the roles played by institutions can evolve over time, in response to both internal decision making as well as external stimuli. It is possible to distinguish at least four kinds of bridging behaviour which can become significant within a regional innovation system. There are institutions in Piedmont which are active in all four of these areas:

- **Bridging the "gap"**: there are hybrid public-private research laboratories which are involved in their own commercialisation activity – Torino Wireless Foundation is seeking to become a marketplace for venture capital for the ICT sector.
- **Subsidising experimental interactions**: The Regional Government has provided funds to encourage movement of personnel between university and business laboratories to the order of EUR 25 million.

- **Mobilising collective demand**: In Piedmont, there are sectoral innovation platforms such as Torino Wireless Foundation which perform that activity.
- **Direct brokerage**: The DIADI project historically and the Chamber of Commerce's Innovation Relay Centre are examples of direct bridging in Piedmont.

Although there has been a promotion of innovation policy through innovative activities, a number of these particular one-off projects have been sufficiently successful to establish themselves as regional innovation actors. The highest profile of these is arguably Torino Wireless Foundation. Each university has its own incubator unit which have also become regional innovation actors. There are a number of regional venture capital funds which focus on early stage investments in high technology businesses. There are six regional science parks across the Piedmont region – recently these have been reformed to ensure that each of them has a strong thematic focus and they evolve from generalist business parks. From 2009, there will be 12 innovation clusters, supported by a total budget of EUR 60 million, to stimulatory innovative clustering in 12 priority thematic areas.

There are a number of private sector collective organisations in the Piedmont region. The Chambers of Commerce in Italy are statutory bodies and responsible for representing business interests in the region. They have also been involved in consultations around the regional innovation law, and have a long-standing involvement in economic development institutions. The Piedmont Chamber of Commerce covers the whole region and was formed in 1957 from the eight regional Chambers of Commerce, employing 400 staff who maintain the enterprise register, as well as providing services for member firms and interest representation.

The Chambers provide a number of innovation services for its members in the region. They support businesses creating proposals for Framework Programme funding, and provide funding support for successful bidders. They are a member of the Enterprise Network Europe, the Innovation Relay Centre for three northern Italian regions. Recently, this network has assumed a leadership role for the Framework Programme in the region. A final contribution from the Chamber to development of the RIS has been in providing the statistical evidence base to monitor and evaluate progress towards a knowledge-based economy.

There are a large number of partnership bodies in Piedmont, and a number of these partnership bodies have solidified over time to establish regional institutions, adding a further dimension of complexity to the RIS

through patterns of co-ownership and interest intermingling. CSI-Piedmont (*qv*) has grown to employ over 1 200 staff with representatives from the region, province, city, other provinces, other municipalities and the full spectrum of the health sector. CSI was an active promoter behind the CSP project, which formed in 1998 as the region's ICT and information society research institute, and now hosts that organisation. Similarly, the COREP inter-university collaboration programme developed into the I3P inter-HEI incubator project as well as the regional public policy research institute.

One rare feature of the Piedmont RIS is the existence of foundations which promote research either directly or through various Universities, research organisations, or other foundations that carry out such work directly. The four main foundations in Piedmont each have their own areas of special research, although they do engage with their actors to create strategic activities:

- *Fondazione Collegio Carlo Alberto*, dedicated to research and high level training in the economic, financial, and economic-juridical fields.
- *Fondazione Giovanni Agnelli*, a private institute of culture and research which works in the field of humanities and the social sciences.
- *Fondazione ISI*, focused, in particular, on the physics of complexity, the structure of matter, quantum computation, and nanotechnology.
- *Fondazione Rosselli,* dedicated to research in the economic, social, and political fields, with particular attention to European public policies (see Box 4.1).

Box 4.1 **The research foundations in Piedmont**

The *Fondazione Rosselli* was created in Turin in 1988 with the main objective of fundamental research applied to the economic, social and political fields, especially dealing with public policy at both the national and European levels. In addition to its academic activities, the Foundation has become a "think tank" for many Italian and European governmental bodies. The Rosselli Foundation's main areas of study include: institutions, public administrations and social policies, technology services and innovation, research and education, industry and finance and cultural heritage. Research results are shared in periodic reports and other published material as well as in conferences and seminars.

Within the **Research, Innovation and Competitiveness** thematic area, the Rosselli Foundation has focused on analyses of the public and private research system, the university and other training institutions, technological transfer processes, national and regional governance systems and the innovation and efficiency systems of the world of banking and finance. Foresight, forecasting

Box 4.1 **The research foundations in Piedmont** (continued)

and assessment analyses address these themes to establish clear priorities for appropriate policy measures. Among the several research centres that support this thematic work are the *Laboratory for the Economics of Innovation* which specialises in the economics of innovation and science policy and the *Centre of Science and Technology Policy* that carries out studies on the dynamics of science and technology and their impact on economy and society, with the aim of supporting policy making, both in the public and private sector in the field of research and innovation.

Examples of projects for Piedmont and beyond include:

- *Innovation Scoreboard for Piedmont's Regional Innovation System:* To best evaluate and compare the region's regional innovation system, this study took into account a broader set of indicators and included a sectoral and time series dimension often not captured in such analyses. The five macro areas for evaluation included: technology, public and private resources for innovation, the financial system, scientific research and human resources.

- *The Foresight Study: Technology Platforms for the Future of Piedmont* was conducted by the Foundation to provide a medium/long-term perspective (2012-2015) of Piedmont's Technology Platforms, focusing on Advanced Logistics, Info-mobility, Product Traceability, and Sustainable Chemicals. The results of the study are designed to enable policy makers in Piedmont to prioritize available public R&D funding more adequately according to the technology platforms' future development potential.

- A composite innovation index was developed in collaboration with the leading Italian newspaper *Corriere della Sera* to track the drivers of innovation performance in industrialized countries. The index is based on 28 separate indicators.

- The ForTransRIS project focused on trans-regional foresight exercises and mapping to support greater collaboration among the R&D plans of participating regions.

Source: Rosselli Foundation *www.fondazionerosselli.it.*

Another peculiarity of the Piedmont RIS is the existence of two Banking Foundations (CRT Foundation and *Compagnia di San Paolo*). These Foundations emerged in the wake of the liberalisation of financial markets, which demanded a reconfiguration of two regional banking groups that had

previously had a strong social investment function in the region. The Foundations ensured the separation and sustainability of the regional banks' existing charitable activities. Both types of Foundation undertake their own research, commission others to do their work, or support existing collaborative activities. The two foundations are:

CRT Foundation

CRT foundation is committed to the promotion of scientific and technological research in particular by supporting higher education institutions in their efforts to build a "bridge" between the academic world and market demands. CRT has been active in promoting for the last four years a set of scholarships to encourage mobility and exchange between universities and firms, the Lagrange Project. These encourage doctoral and post-doctoral placements, and fellowship funding for visiting external scholars. The Lagrange project has also provided grants dedicated to 56 innovative start-up micro-businesses. Another important project is their *Master dei Talenti* Program, which offers grants to young students for 12-month training placements with foreign firms and organisations.

Compagnia di San Paolo

The *Compagnia* channels funding towards science and technology centres of excellence, focusing on fundamental research and experimenting new technologies and on scientific dissemination. The *Compagnia* supports "centre of excellence" projects in life sciences, nanotechnologies and microstructures, information and communication technologies. One of their main projects in Torino, from the second half of 2007, has been the Human Genetics Foundation (HuGeF), in partnership with both the Polytechnic and University of Turin. The new research institute has adopted an interdisciplinary approach and covers activities in advanced training, cutting-edge research in the field of human genomics and proteomics and related scientific and technological disciplines, with a view also to the bioethics element. The *Compagnia* is also strongly committed to the diffusion of science to all possible audiences, from students and teachers to the general public. To this end, the *Compagnia* jointly led, in partnership with a vast group of local partners, Torino's successful bid to host the 2010 edition of the Euroscience Open Forum (ESOF), Europe's most important forum for presentation and debate of leading scientific trends and key science policy issues.

The regional governance sub-system

The lead actor in the regional governance sub-system is the Piedmont Region. The Region is seeking to exploit new powers available through the constitutional changes of 2001. The current Government Agreement has placed great emphasis on the importance of innovation for a number of policy domains. The regional Government has the political capital and authority necessary to take decisions which shape the development of the RIS. The main decision has been for the Region to withdraw from directly funding activities and to put its legitimacy and political capital behind a more programmed and partnership approach to research investments.

The region has been able to use both the Research Plan and Structural Funds programme to control the flow of resources to projects and institutions. The Region has also undertaken important reforms to a number of the implementation organisations which actually deliver the activities. Reshaping these institutions is intended to encourage activities which fit with a strategic approach, and the strategic priorities determined by the programming approach. The effect of these changes has been to position the Region at one degree farther from innovation policy making, but with more instruments and levers able to exert influence over regional partnerships.

A final arm of the Piedmont Region which requires explanation is Enzima-P which is an attempt to create a common approach to technology transfer and business support amongst activities supported by Finpiemonte. It styles itself as the "middleware" necessary for different kinds of innovation support organisation to be able to inter-communicate, and therefore providing a structuring function for the regional innovation system. It was created by the new administration as a means of separating the real estate and business support activities of the regional science parks. Since then, it has concentrated on its strategic mission, and 12 thematic innovation clusters are being established to provide sector-specific foci for innovation and entrepreneurship support:

- Agro-food industry;
- Biotech and Biomedicine;
- Sustainable chemistry;
- New materials;
- Digital creativity and multimedia industry;
- Sustainable architecture and Hydrogen;
- Short chain photovoltaics, biofuels, biomass;

- Mini hydro and biomass from breeding farm;
- Equipment, systems and components for renewables;
- Information & Communication Technology;
- Meccatronics and advanced production systems;
- Textile.

Enzima-P emerged from the earlier "Tecnorete" collaborative activities which developed linkages between science parks. Tecnorete started to develop a co-ordinating function between its science parks, but the aim with the creation of Enzima-P is to extend this co-ordination role more fully. Its goal has been to accelerate the valorisation of knowledge across a range of sectors, but has a slightly wider and more structural mission. Enzima-P represents a regional innovation platform as an attempt to re-energise the regional innovation system-building process and restore some momentum to ensure the new innovation law delivers lasting systemic changes in the region.

The region's municipalities and provinces are important animators within the regional innovation system, although they often seem invisible because of their relatively high numbers and their heterogeneity. Local authorities are specifically prescribed a formal role in the structures of the Research Plan.

The city and region of Turin are greatly recognised within the governance structures for innovation, because many of their policies and strategies influence the regional innovation capacity. Many of the innovation activities which regional actors wish to influence, including the R&D laboratories of firms, universities and CNR are located within the Turin metropolitan area. The provinces and cities of Cuneo, Vercelli and Verbania have also been active in seeking to ensure that they are not neglected in the decisions taken around innovation governance, and the activities they have proposed and supported have come to be significant in the context of the Piedmont innovation system.

- Cuneo was active in the establishment of the agro-food innovation park as well as the recognition of the related industrial district.
- Verbania and the northern lakes region were active is the establishment of the region's original science park, Tecnoparco.
- Vercelli and other eastern local authorities influenced the establishment of the campuses which would later come to comprise the University of Eastern Piedmont.

The regional innovation culture/ style

The problems with Turin can be cast as problems with regional innovation culture. Particular criticisms which can be made are: the existence of a large, established, manufacturing workforce which lacks the skills or the motivation for innovation, and the willingness to work in innovative, high-technology SMEs. This was corroborated in Chapter 2, with evidence indicating relatively low innovation inputs and outputs in terms of R&D expenditure and employment, patenting and licensing patterns. This is a result of the dominance of a few large firms which have declined in recent years without new sectors emerging to take their place.

However, these dominant sectors, although in decline, were once both strong and highly innovative. The brands produced by FIAT have been responsible for a number of classic automobile designs, and these designs have also stimulated innovation through the supply chain. Although Piedmont lacks a School of Industrial Design or an Art Academy, there is nevertheless a strong tradition in the field of industrial design in the region. However, this was often integrated within manufacturing activities, and there was no recognition of the value of design as something separate from the manufacturing process. However, with the hollowing out of the manufacturing sector, and a shift to sub-contracting activities by large manufacturing corporations, Piedmont's capacity for design is becoming recognised as something of value in its own right.

Attempts have been made to mobilise these capacities more actively through the World Design Capital process, which is a shifting annual festival celebrating cities which have made a significant contribution to design. The extremely positive benefits that the Winter Olympics games had for the region's internationalisation as well as for the tourist industry have encouraged regional actors to seek out festivals which may form the basis for sustaining this commitment to internationalisation. There was a call from the World Design Council for a World Capital of Design, which was eventually won by Copenhagen. However, interest in becoming this design centre stimulated regional partners to bid to host a World Design City event.

In 2008, Turin was designated the World Design City, and this is being used to stimulate both wider interest in Turin as a creative, exciting city, but also to increase local interest in the potential of design and innovation. A year-long festival programme has been organised, and the World Design Capital branding has been integrated into Turin's city marketing. *Ateliers* have been established on the main city thoroughfares, where innovative local products are displayed. The branding displays both Turin's role in the design of classic products but also the innovative products now designed in Piedmont which may become classics of tomorrow.

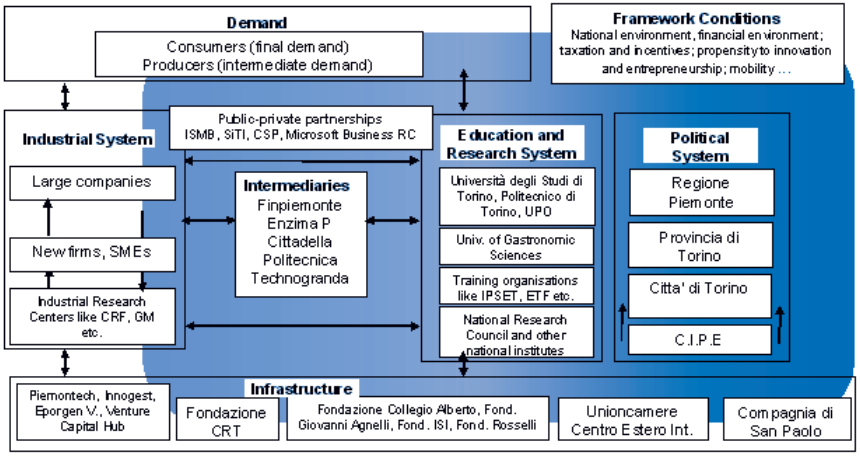
Systemic and dynamic perspectives on the Piedmont RIS

The Piedmont RIS is characterised by a large number of actors. It is important not to confuse the presence of many actors with an interest in innovation with a thick and well-managed regional innovation system. Two complementary ways of considering the RIS balance is whether there is a good mix of institutions, and whether they work together effectively. Piedmont clearly has a good mix of institutions, and many actors prioritise the promotion of innovation. There are also some good examples of institutional co-operation which have made the region more attractive for investment in innovation by external actors.

The Piedmont RIS has all the elements of a well-functioning innovation system

In Figure 4.4, the various actors highlighted above are mapped to the various elements of a RIS identified by the Frauenhofer ISI. This diagram shows that Piedmont is indeed well endowed with a wide range of innovation assets. These form the basis for a potentially very productive regional innovation system. Critically, there are strong industrial and university based knowledge production and exploitation sub-systems, linked through a range of intermediaries and partnership organisations. The political system is increasingly coherently aligned behind the promotion of innovation, which helps to provide a critical mass of activity.

Figure 4.4. **Organisations of the Piedmont innovation system**



Source: Based on information in Fraunhofer ISI (2006).

The RIS elements also work together effectively in some areas

Piedmont has a very rich and a very dense set of regional innovation actors – its main innovative problem is not, therefore, a sparse environment for innovation. Rather, there appear to be problems in the various innovation organisations working together – it is a fractured metropolitan innovation system. What has been particularly problematic in the past has been getting different kinds of internationally-networked organisations, such as companies and universities, to work together. This has meant that there is less constructive interaction between actors and a lower rate of investment in the RIS. This lower investment rate has meant that the regional government has had to directly pump-prime, with investments flowing into creating new activities, as well as being able to – as is the long-term aim – strategically manage investments to selectively support new critical mass.

As shown in Figure 4.4, the Piedmont RIS is represented as a dynamic system in which innovation competencies are built up through collaboration between RIS sub-sectors, but also linking these sub-sectors to resource flows in their wider, external networks. There are a number of examples of institutions and collaborative public-private partnerships which have effectively brought several competitive funding streams together to create a regional centre of excellence, such as ISMB or the Torino Wireless Foundation.

There are good examples of the various sub-systems working well together, with effective intermediary institutions. It is not therefore entirely accurate to speak of barriers to co-operation, but rather, there are disincentives which inhibit or discourage effective co-operation. Creating better interaction and flow between the various innovation sub-systems is vital to improving Piedmont's overall innovation performance, and creating more of these successes. Piedmont currently presents an extremely promising situation – there are many activities present in the region which can potentially join up effectively with other activities. Moreover, the various proposed instruments have prioritised increasing co-operation between the sectors.

HE and business are being encouraged to work together through the various pre-competitive research funding bids and platforms being assembled. The Regional Government has directly reformed a number of institutions over which it has had direct control, most notably Finpiemonte and Tecnorete. The regional Research Plan involves a new governance structure intended to put the principles of co-operation, objectivity, and value added evaluation at the heart of policy decision making.

However, as the figures in Chapter 1 indicate, there is cause for concern that Piedmont is underperforming in terms of innovation. Notwithstanding Italian uniqueness, concerns remain that Piedmont is still extremely exposed to a further decline in its manufacturing base, and that in turn its manufacturing base will require substantial upgrading through innovation in coming years. There is a powerful innovation engine which could drive forward a wider modernisation process, and yet for a variety of reasons, this is not yet happening. Understanding these problems provides an operational means to explore the extent to which the policy interventions since 2005 are addressing the underlying problems in the Piedmont's RIS.

Systemic problems with innovation in Piedmont

The Piedmont problem can in some ways be characterised as the problems which emerge out of success. The region was so successful in developing the quintessentially Fordist industry, with arguably the quintessential Fordist company – Fiat – at its heart. Consequently, its economic development trajectory was perfectly in tune with the long golden decade that followed the reconstruction boom of the 1940s. For a quarter century, the region did not face any significant socio-economic challenges, and indeed policy-maker attention shifted to trying to stimulate economic development in the backward south of Italy.

Thus, although Piedmont experienced changing political-economic institutions as the Italian post-war political settlement evolved, the changes did not have a great deal of salience because these economic structures were not the battlefield for industrial policy conflicts. This has manifested itself in a number of regional characteristics which have acted as a barrier to the effective adaptation to economic challenges.

Path dependence and lock-in

The first is that of **path dependence and lock-in** – because the automotive sector had such an enduring record of success, its decline and adaptation was already well advanced before regional partners addressed themselves to the problems it created. Indeed, the initial response to the announcement of the Single European Act was that it would be good for Piedmont because it would open foreign markets to regional companies. This complacency required a real shock to persuade partners that the resulting hollowing out was a permanent feature and so demanded responses, and so the initial response was less measured than it might have been.

A specific manifestation of this is the absence of a strong evaluation culture within the region for public policy interventions. Evaluation is recognised as lying at the heart of effective innovation strategy development (IRE, 1999), both before and after the delivery of particular interventions. Piedmont did not participate in any of the European-sponsored regional innovation strategy programmes of the late 1990s and early 2000s (such as RTP, RIS and RITTS). A number of interviewees during the regional visit project phase noted that this lack of systematic evaluation undermined effective co-ordination of activities by a regional partner. As no one really understood what particular interventions were intended to achieve, it was very difficult to gauge whether they had been successful, and what further lessons could be learned from the experience.

Fragmentation

The second problem was of a **fragmentation** between the various regional authorities which had arisen in the absence of any kind of large-scale problems requiring a collaborative response. In particular, as it became clear that neither city nor province corresponded well to the needs of the Turin city-region (the most appropriate scale for employment, transport, housing, waste and water planning), there was no strong tradition of collaboration to deal with these issues. Turin enjoyed a special place in the affections of provincial and regional decision makers, who appreciated that a well functioning Turin was necessary for a successful Piedmont. However, this engendered resentment within outlying authorities, and led to a Turin/ region split.

Authorities were primarily concerned with the activities which took place within their territories, rather than considering how they benefited from external activities, and the wider regional benefits which their economy and infrastructure produced. This fragmentation initially jeopardised delivery of the 2006 Winter Olympics Games, which had to be configured to provide incentives for the participation of a broad coalition of regional partners (Maggi & Pipernol 1999; Kresl, 2005).

Leadership and vision capacity

The third problem was a **lack of capacity to develop a shared vision** between the regional partners. Because of the fragmentation between regional and sub-regional partners, there was an absence of tradition of thinking strategically about the future. Places were more concerned about planning the future as an iteration of the present based on their own localised priorities, rather than engaging with what larger scale trends might

mean for the region as a whole, and then planning on the basis of optimising their placing within this evolving Piedmont region. This was a particular problem from the early 1990s as key local and regional leaders attempted to enrol a capacity for change, because public actors were not initially able to articulate a vision broad enough to satisfy the interests of the business sector (Maggi & Pipernol 1999; Kresl, 2005).

There were also capacity problems within regional businesses, further undermining regional attempts to enrol businesses into regional coalitions seeking collective solutions to regional problems. As the industrial sectors were hollowing out, there were a declining number of interactions between businesses in the supply chain, and as businesses became internationalised, they had less time to pay attention to other regional firms. This disruption of regional industry undermined the capacity of the region's large, successful firms to provide a strategic leadership role as they had difficulties in articulating a strategic vision for regional success beyond that which would optimise their companies own competitive positions.

Piedmont's complex innovation ecology

The final problem for the regional innovation system is that there is an **extremely complex innovation ecology** along a variety of dimensions. The first element of this is that there are a huge number of actors involved in innovation and playing a wide number of roles, so that it becomes almost impossible to mobilise all the necessary actors to address particular issues without arriving at an unwieldy grouping of all regional actors. This has added to the complexity of mobilising a sensible leadership team able to place the issue of regional innovation at the top of the political agenda (although this was addressed when the regional government prioritised innovation from 2006 onwards).

Industrial Associations in Piedmont have been active advocates of a simplification process, because there is no single point or office to which firms seeking assistance with innovation can apply for help. A further problem is one of consistency, in that the outcome of firms seeking support often depends on the coincidence of who they approach first for that help. This is clearly an undesirable state of affairs and suggests that there is some unexploited potential remaining within the Piedmont RIS. Some simplification and signposting will be necessary in order to unlock that potential.

Secondly, this complexity has led to strong clustering within the regional innovation system, with a great deal of fragmentation along sectoral lines. Particular actors know other similar actors but there is a tendency not to look between these innovation clusters for capacity to exploit emergent

opportunities. This means that despite an incredibly rich innovation ecology, its dynamism is relatively low (as measured through the R&D statistics in Chapter 3 above).

Thirdly, Piedmont's bridging institutions were all born in different periods to satisfy different needs at different tiers. For this reason, it was very difficult for different institutions to co-operate and to work productively together. Moreover, most of the bridging institutions began their activity with a specific mission that afterwards changed according to the real situation with which they had to cope. On the other hand, bridging institutions face the problem of fragmentation of the academic world and of the business sector in Piedmont. There is the need for greater co-operation among actors but also between bridging institutions within the region. Most of the time it is the lack of co-ordination between actions carried out by bridging institutions that negatively affects the capacity and possibility of co-operation among firms, universities and research centres.

This hints at the existence of potential **invisible barriers** within the regional innovation system which inhibit collaboration between actors which might otherwise be sensible. These invisible barriers are a particular problem for policy makers because of the risk that an otherwise sensible policy will be blocked because it assumes that partners that might rationally collaborate in reality are unwilling to do that. There are also high levels of uncertainty around the opportunities for regional innovation, which are manifested in relatively low new firm formation rates from staff employed within public research laboratories and universities. This is also exacerbated in universities by the decline of real funding for universities, so that staff are distracted from potential commercialisation and entrepreneurial activity in the search for tenure within the university.

Chapter 5

Filling the Gaps Through Innovation Policy

The Regional Law on Research in Piedmont has been operational for less than two years, and so it is impossible to fairly evaluate the extent to which it has been able to address the sometimes deep-seated barriers within the regional innovation system identified in Chapters 3 and 4 above. What is nevertheless evident at this stage is the impact of the interventions on the existing system actors. This chapter aims to gain an insight into the likely future impacts of the three year Research Plan by looking at the early indications of what has been achieved. This is done along four separate dimensions:

- efficacy of the choice of instruments and their fit with model innovation policy;
- matching governance organisation to the way that innovation decisions are taken in practice;
- exploitation and expansion of an existing centre of excellence (Torino Wireless Foundation);
- impacts on co-ordination and rationalisation of existing innovation promotion bodies.

Comparing Piedmont's instrument selection

The previous chapter indicated that Piedmont has indeed adopted a wide mix of policies in an attempt to improve the quality of and levels of collaboration in regional business innovation. On this basis, it is hard to judge whether an appropriate balance has been achieved between filling gaps within Piedmont's RIS, and concentrating resources effectively to deliver systemic change. The reality of RIS change is that the suitability of policy action does depend on the nature of inherited organisations and institutional capacity.

In order to compare or benchmark the policy mix in one region, it is necessary to develop a common framework which serves as the common basis for comparison. The classification already presented in the previous chapter serves the purpose of this common framework. The policy objectives were deducted from other frameworks recently used for European comparisons (TrendChart, Erawatch). Unfortunately, the regional analytical level on these information platforms is still underdeveloped. So it is necessary to fill in the framework with information about programmes and measures from different sources.

Besides the common framework, it is necessary to deal with the general framework conditions for research and innovation policy at the regional level. This includes the institutional set-up and the basic philosophy behind the conception and implementation of different policy measures. Usually, as it is also the case in Piedmont, the research and innovation policy activities are much broader than the mere funding by different programmes. In the context of this review a short overview of these aspects will be provided.

In benchmarking exercises, the major question always addresses the adequacy of the comparable cases. They could be similar in size, structure and dynamics in order to identify possible gaps in the instruments' composition on a similar hierarchical level. They could be different in order to identify other approaches which seem appropriate to test and adjust, or they could cover both aspects, *i.e.* a horizontal and a vertical benchmarking. Piedmont, in this regard, is a manufacturing region with a relatively high level of R&D, although it has not proven as successful economically as its neighbour, Lombardy. From this point of view, there are many similarities with two German Länder, Baden-Württemburg and Nordrhein-Westfalen.

Piedmont as an advanced manufacturing economy

In the following section, Piedmont will be compared with Baden-Württemberg and Northrhine Westphalia. With regard to most of the major R&D and innovation indicators (*e.g.* gross domestic expenditure on R&D [GERD] per inhabitant, GERD in percentage of GDP, business enterprise expenditure on R&D (BERD) per inhabitant, BERD in percentage of GDP, total R&D personnel in full time equivalent, and total EPO filings), Baden-Württemberg ranks first among the 60 to 80 European NUTS-1 regions for which these data are available at Eurostat.[1] On the contrary, the position of Northrhine Westphalia ranges from third (total R&D personnel) to 18th (BERD in percentage of GDP).

For comparison, among the 136 to 244 European NUTS-2 regions, for which the same data are available, Piedmont's position ranges from eighth (total R&D personnel) to 54th (BERD in GDP). While Baden-Württemberg

is one of the innovation engines of Europe, Northrhine Westphalia is, as is Piedmont, an old industrial region which faced severe structural problems from the 1970s onwards, but which now is well on the way to recovery. Table 5.1 provides an overview about important instruments and measures in the three regions.[2]

Table 5.1. **Policies in Piedmont, Baden-Württemberg & Northrhine Westphalia**

	Piedmont	Baden-Württemberg	Northrhine Westphalia
1. Improve innovation governance and strategic intelligence for policy-making.	Different programmes to support strategic vision building through platforms, foresight, and evaluation. Support for trans-national co-operation though attraction of foreign researchers and teachers.	Guidelines for research policy by the Ministry for Science, Research and Arts. Co-ordinated actions by the Ministry for Science and the Ministry of Economic Affairs.	Concentration of innovation promotion towards one ministry (for innovation, science, research and technology). New comprehensive innovation strategy.
2. Foster an innovation friendly environment .	Dissemination activities, information exchange.	Dissemination activities, information exchange (Innovation Portal).	Intensified marketing strategies for Northrhine, Westphalia.
3. Higher Education / Human Capital Development / Gender Issues.	Research networks, human capital development (researchers, PhD students), life-long learning.	Safeguarding scientific excellence at the universities. Promotion of research and teaching for universities of applied sciences. Gender support programmes at universities (support of different projects during 2002 and 2007). Promotion and consulting for firms that wish to support, and help qualify, older employees.	Law for the freedom of universities (strengthening their independence): new possibilities to co-operate in public private partnerships with the business sector.
4. Development of Research Infrastructure.	Investments in research infrastructure. Additional regional support to national funding.	Promotion of centres for applied research at universities of applied sciences ("Fachhochschulen"). Support of regional applied oriented	Regional co-funding of the national excellence imitative for universities. Participation in the national pact for innovation: at least 3 % annual growth rate

	Piedmont	Baden-Württemberg	Northrhine Westphalia
		research institutes ("Innovation alliance Baden-Württemberg"). Development of strategic research fields (*e.g.* life sciences, new materials, nano and microsystems technologies, optical technologies).	for the funding of interregional research organisations.
5. Strengthen innovation including the protection and commercialisation of intellectual property.	Funding of projects in the innovation supply chain. IP and patenting support. Research commercialisation activities. Support for growth of firms. Innovation management support.	Promotion of competence centres and networks. Technology promotion programmes. Support for technology transfer, by maintenance of various Technology Transfer Centres, i.e. TTI GmbH.	Establishment of an innovation fund by using revenues from privatisation activities. Allocation of at least 50 % of ERDF funding for the promotion of innovation.
5. a) Strengthen entrepreneurial innovation in the SME sector.	Technology check-ups. Project funding for highly innovative companies.	Financial support for SMEs and for consultancies concerning economic, financial, technical and organisational difficulties.	Development of a technology and innovation programme for innovative SMEs (revolving single programmes in still to be defined fields).
5. b) Industrial policy and strategic technology policy.	–	–	Stronger focus on innovative (new) firms and on world-class research. Revitalisation of nuclear and nuclear safety research.

	Piedmont	Baden-Württemberg	Northrhine Westphalia
6. Encourage technology and knowledge transfer to enterprises and development of innovation poles and clusters.	Support of research and bridging institutions. Technology transfer activities. Recruitment of innovators.	Promotion of innovative inter-university co-operation (*e.g.* like Karlsruhe Institute of Technolog:, the planned merger between Karlsruhe University and the Research Centre.,Karlsruhe). Intensified collaboration between research institutes and companies (industry on campus model). Promotion of innovation assistants (employment of researchers in firms). Innovation vouchers and innovation coaching. Promotion of clustering and networking (Cluster dialogue Baden-Württemberg, cluster platforms).	Support of the "Innovation Alliance of the universities in Northrhine Westphalia" for improved knowledge transfer. Closer linkages between basic research and applied research. Development of a joint cluster strategy between Ministry of Economics and Ministry of Innovation. Further development of the patenting and licensing activities (PLOs).
7. Promote and sustain the creation and growth of innovative enterprises.	Platforms for new entrepreneurial activities Seed and growth funding.	GuW Mittelstandskredit, (start-up) financing for SMEs younger than eight years'old,. L-Bank, state bank of Baden-Württemberg. NewCOme.de: coaching support for entrepreneurs. ifex – Start on the campus, consultancy and support for incubators, regional networks, competitions. Young innovators, financial promotion of academic spin-offs.	Programme for the support of innovative spin-offs from universities.

Box 5.1. **Northrhine Westphalia**

While Northrhine Westphalia reformulated its innovation strategy in August 2006, Baden-Württemberg published a new outline of its innovation and technology policy in May 2008. This makes it clear that in both federal states (and in other states of the 16 federal states as well), a reform in regional research, innovation and technology policy is underway. This development is triggered by the fact that in the seventh European framework programme an even higher share of the structural funds is devoted to the support of innovation activities than in the 6th FP.

In **Northrhine Westphalia**, for example, EUR 8 billion should be invested in research and development between 2007 and 2010. Additionally, an innovation fund based on privatisation revenues should be created and more than 50 % of the ERDF funds should be devoted to innovation promotion. Besides, universities, research institutes and firms should better profit from external programmes of the federal government, the EU and research foundations by improved framework conditions for research and development in Northrhine Westphalia (NRW).

The vision formulated for 2015 is to become Germany's first and leading location for innovation. This is an ambitious objective, because GERD was decreasing since the early 1990s and the lag between NRW and Baden-Württemberg in GERD as a percentage of GDP (4.19% and 1.78% respectively in 2005) is so pronounced that this objective is not realistic. The problem for NRW is that, at least in the past 20 years, innovation and technology policy was directed towards too many activities so that budget constraints mostly lead to the effect that after some years of funding no sustainable structures could be established.

Policy was mainly oriented towards short-term success (with regard to election periods) and did not succeed in really establishing competitive technological and scientific potentials. The share of expenditures for universities and non-university research centres was below the average for all federal states of 6 % in 2005, with a much below share of expenditures for non-university research centres (rank 16 of 16 federal states), which cannot be explained by a low number of these institutes in NRW.

The regional specialisation in technology is only slightly pronounced, the only exception is Aachen with its well known Technical University. On the other hand, good potential exists, since around 430 000 students are enrolled in the regional universities, and the universities have an above average share of all German universities in 6 FP projects (388 of all 1 998 German projects). NRW now tries to focus its research and innovation policies towards a closer range of activities.

Box 5.2. **Baden-Württemberg**

While in NRW with the new innovation strategy all measures should be co-ordinated by one ministry (for innovation, science, research and technology), in **Baden-Württemberg** at least two ministries are responsible for research and innovation promotion (for science and for economic affairs). In the past, co-ordination between these two ministries was an issue, but today with the new framework for innovation and technology policy an approach is made for a coherent innovation strategy.

The major objective of this strategy is to secure and further develop the leading position of Baden-Württemberg within Germany (especially with regard to the major "competitor" Bavaria), but also to improve its position as innovation engine and as an attractive investment location on the global scale. Three major fields of activity are important in this respect: strengthening of world-class research, further development of technology clusters, technology promotion and innovation consulting.

Unlike in many other federal states, the role of the regional government is not so much directed towards direct public intervention (*i.e.* technology promotion), but rather towards the design of favourable framework conditions. This is due to the fact that in Baden-Württemberg more than 80 % of the gross expenditures for R&D originate from industry, while in NRW the share is 62 %. There is, therefore, no plan in Baden-Württemberg to increase public spending in this field. Some room for manoeuvre is created by the "Landesstiftung", a non-profit foundation which annually supports pre-competitive research activities (which have to strictly adhere to the rules for non-profit-making) with around EUR 18 million.

For more than 10 years, an important instrument of research funding is the priority programme of the Ministry of Science, Research and Arts, through which the allocation of funds to universities is organised in the form of a competition (and with the use of leverage effects), in order to stimulate the universities look for other national or international funding sources. Other recent activities deal with the further development of technology clusters, not in the form of a big programme, but complementing already existing networks between firms and research institutes.

Clusters should be developed in medical technologies, microsystems, information technologies and media, life sciences, fuel cells, crystalline silicon solar technologies, aerospace technologies, intra logistics, digital production, photonics, material sciences, and technical textiles. As can be seen from the role the Steinbeis model plays in technology transfer and innovation consulting, the philosophy in Baden-Württemberg was and still is to create a dense network of organisations which support research and innovation activities in SMEs and by this qualify them as an interesting partner and supplier for the large firms in the automobile, mechanical engineering and electronic sectors which are a special feature of the regional economy.

Box 5.2. **Baden-Württemberg** (continued)

In this respect, 13 regional research institutes are supported by institutional funding, which should complement the regional research spectrum additionally to the other applied oriented research institutes working under the umbrella of the Fraunhofer Society.

Lessons for Piedmont's progress to date

Comparing the three regions in their research and innovation policy, it can be said that Baden-Württemberg is the most advanced case. The focus here is on the development of the research system (with Karlsruhe, Heidelberg, Freiburg and Konstanz, 4 out of 9 German universities of excellence are from Baden-Württemberg; 1, the NUTS-2 Aachen, is from NRW) and on the creation of favourable framework conditions in the field of institutional funding, transfer and innovation consulting, cluster and network building. Baden-Württemberg possesses a long tradition in this kind of innovation policy, which is favoured by an economic set-up in which many large companies act as important innovation and networking engines.

The policy mix and approaches in Piedmont and NRW are more similar, because they have to react to economic conditions which are not as positive and well developed as in Baden-Württemberg. In both regions, new research plans and innovation strategies have been formulated and are now in their first phase of implementation. Both regions try to improve the conditions for research and innovation and formulated strategic goals which should express this realignment in research and innovation policy.

While the major objective of NRW is a fairly ambitious one (to become Germany's number one innovative region), this is a more realistic goal in the Piedmont, because it focuses on the successful completion of the transition process but is not a definite goal. Besides this, many similarities exist in the way that the essential policy elements like the development of the research infrastructure, the strengthening of innovation in SMEs and knowledge and technology transfer activities are addressed. Unfortunately, it is not possible at this stage to assess which of the programmes and measures are more appropriate and successful under the specific regional conditions, since this would require an in depth evaluation of each programme.

Nevertheless, it seems justified to point to some factors of failure and success with regard to the policy mix in Piedmont, which can be derived from the comparison between NRW and Baden-Württemberg. All regions have a broad spectrum of measures in the sense that all main policy objectives listed in Table 5.1 are addressed.

This suggests that a single focus on either higher education/research infrastructure or the strengthening of innovation in firms is not appropriate, but a policy orientation both towards the knowledge and research infrastructure and the innovation support in firms is also required. In this respect, a regional innovation strategy should be balanced. As experiences from the past in NRW show, a too broad spectrum of single activities, even changing every three to five years in their focus, is contradictory to the development of stable and sustainable structures.

With regard to the available financial resources, measures should be formulated which can be funded for at least seven to ten years. Institutional funding, new organisations, information or cluster platforms in particular need time for the development of self-sustaining or partly self-sustaining structures. Other measures which are devoted to the mitigation of system failures, *e.g.* in the field of innovation collaboration between small SMEs and research institutes, need an even longer orientation. This is shown by the Baden-Württemberg case, where this issue has been addressed by policy for decades and thus provides a stable background for learning processes and a continuous offer for new firms opening up their business activities.

An important aspect of the Piedmont system is the linkages between the knowledge producing organisations (*i.e.* mainly universities and other research institutes) and the knowledge users. As examples from many cases show, it is by far an easy task to bring these two important economic pillars together. Different "languages", behaviours, incentives, and time-horizons often prevent close and fruitful interaction. Measures are therefore necessary which allow both sides to interact, either through collaborative research project funding, the exchange of people between the two worlds, or through institutional settings which either promote pre-competitive joint research activities (mainly for SMEs unable to conduct research and development by themselves), innovation management and consultancy support, or the creation of new forms of research labs in which firms and institutes co-operate closely together in a public-private partnership.

Piedmont's research and innovation policy can generally be characterised as "well-balanced". They have avoided the common tendency for picking winners, leaving the policy extremely vulnerable to external shocks. Neither is it so generalised that the activities lack the critical mass necessary to deliver the desired change in economic development trajectory. Not only are the important objectives highlighted by several measures and programmes, but also the organisational set-up with the different funding, bridging and transfer organisations seems to be well developed.

What will be important for the future is an intelligent use of the tools foreseen to improve innovation governance in Piedmont. In the course of the implementation of the different measures and during institutional funding, evaluations should be used to identify weaknesses and strengths in the conception of programmes, effectiveness in policy implementation, intended and unintended additional effects and the whole impacts of a measure or an organisation.

When this strategic information and knowledge is available, it can be used in strategic discourses about the future of the Piedmont's research and innovation policy and for an adjustment and improvement of the set of measures formulated in the framework of a Research Plan.

Placing entrepreneurship and innovation into the 'DNA' of the Piedmont triple helix

There has been much emphasis within the whole Research Plan process of attempting to build an effective innovation system. In the use of the language of strategic and systemic innovation, there can be the risk that the emphasis becomes on supporting particular activities rather than ensuring effective business innovation outcomes. The industrial history of Piedmont has been associated with innovation within large firms, which can create a comfortable and munificent environment for innovation, with many resources, the time to consider ideas, and effective innovation management processes (such as the international standard for innovation process management – ISO9001) which provide momentum to translate ideas into the market place.

Although large firms and innovation quality standards remain important within innovation networks, this raises the question of whether a new divide is emerging within the region between experienced innovators, and those firms not currently active within innovation. The conditions necessary for the creation of new kinds of innovative firm do not appear to be present in Piedmont. In particular, as one interviewee during the review visit to Piedmont noted:

"Accounting, finance, production are not present in the DNA of researchers"

This suggests, on the one hand, researchers' lack of entrepreneurial spirit and, on the other, the need for coaching for spin-offs. Alongside this, industrialists highlight the universities' lack of involvement with applied research, although industrialists are clear in not calling the scientific skills of universities and their researchers into question. This challenge relates more to

the level of commitment to industrial engagement by universities. One element of this relates to the organisational and management abilities of universities, research groups and researchers around creating a company and the running of projects. The academic community lacks both business experience and an entrepreneurial spirit and is, moreover, thought by some to be linked to the poor success rate of start-ups, both in quantity and in quality.

Recent thinking highlights the importance of the interaction between researchers, government and businesses for driving forward constructive innovation capacity building. The idea of the "triple helix" has been suggested as a metaphor for how this can be improved – governments can improve co-operation between universities and firms, and in so doing, alter the "DNA" – the habitual behaviour and inclination of each sector. If this is done effectively, this can help to deliver core government policy aims. The "holy grail" for triple helix policies lies in creating effective entrepreneurial triple helices. In these situations, businesses and research organisations work together creatively to bring new ideas into the market whilst negotiating with government to create supportive market conditions for those activities.

This raises the question of whether it is possible through the mechanism of a systemic research and innovation policy (as has been followed in Piedmont) to invest simultaneously in both high-quality research activities, at the same time as encouraging those researchers to behave in new ways (entrepreneurially). Clearly, the long-term success of the Research and Innovation Plan will lie in whether or not it can encourage the successful valorisation – within regional businesses – of knowledge held in public and private research organisations. There is a challenge around the necessary entrepreneurial and business skills necessary to promote this valorisation. In short, the question is whether the Research and Innovation Plan is helping to build a more effective and entrepreneurial triple helix in Piedmont.

From promoting entrepreneurship activities to an entrepreneurial approach to innovation policy

The issue around entrepreneurial "DNA" is important to understanding the efforts made to rectify the situation in Piedmont. In the last quarter century, there have been many policy experiments and efforts made to promote entrepreneurship and improve business birth rate levels. The one consistent finding in all these attempts has been that there is a strong positive relationship between the "munificence" of the environment for entrepreneurship and the ease with which public policy measures can promote entrepreneurship.

Conversely, in those regions with "sparse" entrepreneurial environments, there can be extremely perverse outcomes from policies seeking to encourage entrepreneurship. These can include increasing bankruptcy and business failure rates, undermining the local capital base, and displacing good ventures with easy ventures in personal service sectors (Mole *et al.*, 2004). This is the issue faced by Piedmont, improving the entrepreneurship environment and helping potential entrepreneurs to access the various resources required for new firm formation.

Part of this is a "down-stream" problem: that there are many people within the region who do not have a good understanding or sufficient experience of entrepreneurship. Part of this comes about through the industrial structure of Piedmont, in which there are many large firms, and innovation activity is concentrated within large firms. Thus, the potential entrepreneurs developing new ideas and products are in the kinds of environment which do not encourage them to embrace the risks and challenge of establishing their own businesses.

It is possible to distinguish "upstream" and "downstream" solutions to these problems faced by Piedmont. "Downstream" solutions are those which aim to provide more resources to entrepreneurs at the point of new firm formation, such as subsidised access to venture capital, university knowledge, consultancy and business advice services. The main problem with downstream solutions is that they are reactive to the demands of entrepreneurs and require that they actively be sought out. This can have the effect of delaying the moment of entrepreneurial intention to a crisis event, such as a redundancy, which at the same time undermines that individual's access to other forms of capital which might assist with new firm formation.

The alternative is to promote upstream solutions, in which potential entrepreneurs have more exposure to entrepreneurship through their career trajectories. This exposure can be built structurally into activities such as university courses at bachelor and masters level, by requiring recipients of research funding grants to consider their applications or through encouraging exchanges between the different kinds of employer, large firm, SME, public organisation and research institution.

The key problem with these upstream solutions is that they attempt to change the behaviour of well-established institutions. Consequently, these activities which can be launched in a blaze of publicity, prove harder to make successful than originally anticipated, and become marginal, overlooked and ultimately fail. Changing a region's entrepreneurial DNA is a long-term process that involves establishing many intermediate steps that ensure that particular activities remain central to the interests of the supporting organisations. One institution which has managed to sustain its

entrepreneurial orientation over 25 years is the University of Twente, which has evolved from supporting consultancy start-ups by graduates to building entrepreneurship into an increasing range of its core teaching activities.

Box 5.3. **Minor in entrepreneurship at the University of Twente**

The University of Twente in the Netherlands has, for a quarter of a century, styled itself as the "entrepreneurial university". The university was established in 1961 to support industrial conversion of the textiles industry, but the steady decline of that industry in the face of overseas competition undermined the rationale behind the university and its likelihood for survival. At the time, the Rector of the university was Professor Harry van den Kroonenburgh, an energy researcher who had experimented in entrepreneurship, and who encouraged his masters students to turn their thesis research into commercial activities. Van den Kroonenburgh's philosophy was that an entrepreneurial university was entrepreneurial at every level, and that students, staff and services all had to be oriented towards promoting entrepreneurship.

In the 1980s and early 1990s, the emphasis lay on providing all graduates of the university with the opportunity to pursue entrepreneurial trajectories. The Temporary Entrepreneurs Scheme (the international standard for innovation process management) was established. TOP continues to this day by providing graduates with business ideas with micro-finance, business mentoring, research advice and workspace. TOP has successfully produced around 20 companies per year from the university alumni and has moved between a variety of different funding regimes, preserving its integrity and avoiding disruption. Central to this was that it was a successful project and was closely aligned to the institutional mission, so it proved difficult to close the activity down even when institutional enthusiasm for the activities dwindled.

From the turn of the century, the accent has lain more in exposing as many students as possible to the ideas of entrepreneurship and providing them with the tools to establish their own business either at graduation or further in the future. To that end, the Minor in Entrepreneurship has been established as a means of encouraging entrepreneurship in the whole student base. In the course of this minor, students work with real company problems to identify how new products can be brought to the market and new businesses established. The course is open to students across the university's faculties, and provides access to the Masters in Enterprise and Innovation.

A clear ambition for the Research Plan is on changing this entrepreneurial DNA in Piedmont. Whilst it is important not to overstretch a metaphor, the point remains true that this is a long-term process, and is difficult to achieve directly. It is important to anchor policies and changes around institutions which outlive particular policy cycles. This means that

when entrepreneurship education is "no longer the sparkling new idea it was" there is an automatic tendency to equip people with the skills, competencies and attitudes which encourage new firm formation. This provides in turn a steady flow of individuals towards "downstream" solutions – venture capital funds, business advice, incubators and innovation vouchers – which in turn realise a better rate of new firm formation.

The need for a mix of upstream (attitudinal) and downstream (resource-based) tools to shift entrepreneurial intentions is explicitly recognised in the previous section. This demonstrates that there are indeed a balanced set of policy instruments *at the present time*. Notably more important is the sustainability of the upstream instruments, and whether they will produce a cohort of young entrepreneurs who will, in the medium term, change the region's new firm formation performance.

One of the consequences of the complexity of the Piedmont RIS is that it has a tendency to "wrap' new activities in existing institutions. Consequently, organisations formed in the 1970s and 1980s such as CSI-Piedmont and COREP are themselves sponsors of more novel activities such as the ISMB and DIADI 2000. There are reasons to be optimistic that entrepreneurship promotion activities will provoke a long-term system shifting effect, and that this effect will be greater the more they are embedded within existing network activities.

Growing new firms in existing networks: the case of Torino Wireless Foundation

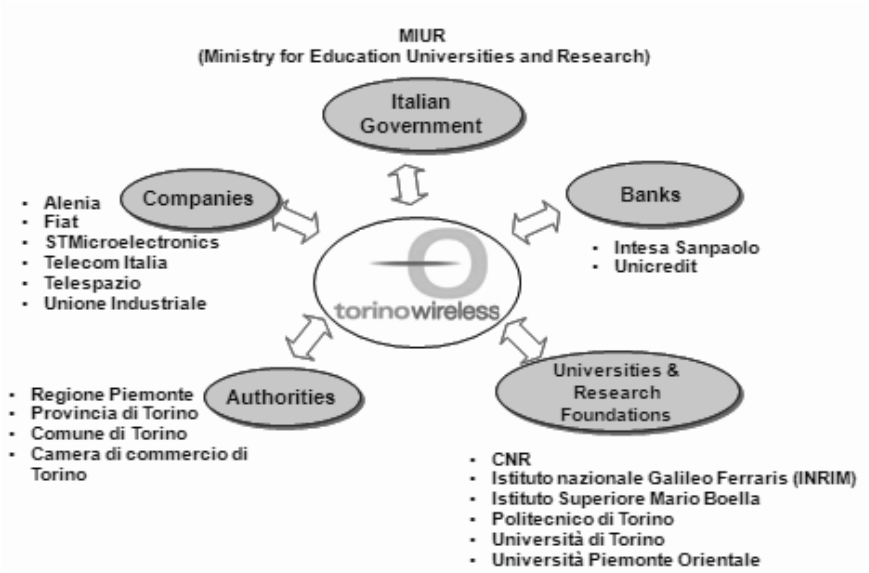
One example of a new project which has sought to improve the entrepreneurial environment within Piedmont is the Torino Wireless Foundation. As noted in the first chapter, the socio-economic system of the Piedmont region has been described as being structured around districts, either "official" districts, or high-tech clusters, (such as Torino Wireless and, in the not too distant future, Aerospazio) as well as the "unofficial" districts. Torino Wireless is labelled as "official" because it is recognised by the MIUR (the Italian Ministry for Education, Universities and Research) and therefore benefits from government support (see Chapter 3). However, this is not the district's only strength.

The Torino Wireless Foundation was conceived by Professor Rodolfo Zich, former vice-chancellor of the Polytechnic of Turin and president of the *Istituto Superiore Mario Boella* (ISMB). The TW Foundation was created between 2001 and 2003, by public (State, regional, provincial) and private (ISMB, Bank San Paolo) entities. TWF has since its inception focused on three main tasks which seek to encourage entrepreneurship:

- **Enterprise acceleration**: a particular problem for the sector is encouraging the best and brightest graduates either to start their own businesses, or to work with new business to stimulate innovation.
- **Networking**: creating an institutional space where companies could work together, share and exploit knowledge, and collaborate on joint projects.
- **Venture Capital**: Investors were needed to support and accelerate business growth.

The formal inception of TWF was marked in 2001 with the establishment of a Memorandum of Understanding; however, becoming operational took a further four years, with the Foundation being established (2003), a programme agreement being signed (2004) and stable annual accounts achieved in 2005. The various founding partners of the Foundation are also its financiers; the government provides EUR 26 million over five years, although without having a share in the Foundation; the Region has provided EUR 11.5 million over the same period, matched with European funds, for both SME technology transfer and collaborative project activities. The province and commune have provided EUR 8 million and EUR 6 million respectively, the CCI EUR 2.5 million and the private sector –partners provide EUR 80 000 annually. The Research partners of the foundation only make a symbolic financial contribution (EUR 1 000 pa), with the exception of ISMB which participates as a full business member.

Figure 5.1. **Torino Wireless Foundation: associates, founders, financiers**



Source: Adapted from Torino Wireless Foundation presentation.

From strategy to practice: making it happen on the ground

The Regional Research and Innovation Plan was initiated in 2006, at the same time as TWF was emerging as a full-functioning institution seeking to promote entrepreneurship. The principals involved in TWF are the same principals involved in the other elements of the Research Plan. It is therefore unsurprising that this co-operative vehicle, which took considerable efforts to successfully establish, has become a focus for co-operative activity and the promotion of entrepreneurship within the region.

The case of TWF is not unique in the Piedmont context, in bringing together a range of existing actors to try to change the way that existing activities are carried out. What does distinguish it is the way that a range of funding streams have been arranged which ensure that TWF is not dependent on a single enthusiastic promoting organisation. TWF is one of a limited number of flagship **national** technology districts and its activities therefore benefit from national imprimatur. This may grant them the necessary long-term stability and sustainability to have a chance of making a real difference to Piedmont's underperformance in terms of new firm formation in high-technology sectors. It has been an unqualified success: if other districts were

to be identified within the region, they ought to follow the example of TW with a counterpart of their own.

The Torino Wireless Foundation certainly benefits from its participation in the national programme, which provides some of the key resources for delivering the innovation outcomes. In that sense, it is comparable with the *Pôles de Competitivité* project in France, a cluster activity. In France there is a well articulated contract between centre and region which places obligations on the central state to deliver activities of regional value. One region which is in many ways very similar to Piedmont is Provence-Alpes-Côte d'Azur (PACA), which borders Piedmont to the west. In PACA, national and regional government have come together to co-invest in a Cluster Group in High-Technology Security, recognising the many ICT firms active around the Sophia-Antipolis growth pole.

Another of its strengths lies in the fact that it developed around one industry – ICT – which has great potential both for technological innovation and usage. There is potential to use this cluster to stimulate innovation in other sectors which may benefit from the application of ICT, the notion of so-called "related variety". There may be potential therefore to create mini-clusters within TWF which seek to promote ICT applications in particular market segments, bringing together existing ICT businesses with potential end-users to drive innovation and entrepreneurship activities in other innovative sectors in Piedmont.

There is an existing infrastructure of focused business parks which could act as hubs for these related clusters. Likewise, the existing themes of interest to science parks could provide areas for exploration as to whether they could benefit from closer collaboration with the ICT sector, and by extension from their own "mini-cluster". There is the potential for TWF to become a central node in a more general innovation promotion network extending into the various sectors present in the region in which innovation and entrepreneurship underperformance is the norm.

In Piedmont, strengthening the business cluster policy could encourage SMEs to grow to the levels of innovation that the Region is trying to develop. TW's evolution in ICT should serve as an example for other sectors. In such a case the role of new organisations such as Enzima-P could be to identify and help establish new industries, linked, for example, to the application of technologies developed in the parks.

Box 5.4. **Concentrating resources in flagship projects: the *Pôles de Competitivité* project**

The elaboration of French regional innovation strategies, and the co-ordination among these, is realised through special multi-level governance contracts for regional development, called State-Region five-year plan contracts (*Contract de Projets Etat-Région-CPER*). The plans help to expand the regional development policy approach to include a wide range of beneficiaries (agglomerations, zones not corresponding to existing administrative boundaries) and domains (industry modernisation, others areas of public responsibility). In the *Provence-Alpes-Côte d'Azur* region the State-Region five-year plan contract is involved in the creation of regional skills areas, based on a multi-disciplinary scientific approach and reinforcement of the link between research, higher education and industry.

Other important regional plans that contribute to develop innovation and R&D policy are: *Schéma régional de développement économique*, *Schéma Régional de l'Enseignement Supérieur et de la Recherche*, *Schéma Régional de Développement de la Société de l'Information*.

The PACA region hosts nine of the 71 *Pôles de Competitivité* (clusters) existing in France, two of which are internationally recognised: Mer PACA, located in Toulon and specialised in sustainable development and safety, and SCS – Solutions Communicantes Sécurisées, located in Sophia-Antipolis and specialised in Micro-electronics and telecommunications, both of them created in 2005.

The most highly-developed sectors in the region are the Aeronautical industry, the leading sector in the region in terms of R&D, the chemical industry, the second largest production industry in the region with around 600 companies, and the Micro-electronics industry, which makes the region the national leader for the production of semi-conductors, and is characterised by the presence of important large companies such as ST Microelectronics, and divided into three geographical areas (Rousset, La Ciotat, Nice-Sophia-Antipolis).

The minimum amount of funds allocated by the French state to the *Pôle de Competitivité* has been fixed at EUR 1.5 billion for the years 2006-2008. The 15 labelled international or "destined" to be international clusters should receive approximately 80% of that central government funding (competitive regional clusters, OECD 2007).

The PACA region invests many resources in the development and support of its *Pôles de Competitivité*. For instance, the item 'Competitiveness clusters and innovative enterprises creation" and "Research and Innovation" represents 4.37% of the Île-de-France's CPER 2007-2013, 13.5 % of the Rhône Alpes' CPER 2007-2013 and 20.2 % of the CPER 2007-2013 in Provence-Alpes-Côte d'Azur. (pro-inno France country report 2007).

Box 5.5. Extending the scope of a successful innovation node: the PRIDES programme

The *Schéma régional de développement économique* approved in 2006 in PACA has labelled 26 so-called PRIDES – *Pôles Régionaux d'Innovation et de Développement Economique Solidaire* (regional clusters of innovation and economic development). These are clusters of firms belonging to the same sector, created with the aim of supporting co-operation among these firms, including the *Pôles de Competitivité*. The PACA region invested around EUR 47 million in the PRIDES, both existing and emergent.

26 PRIDES are currently identified in the region. The 9 poles of competitivity, located in the PACA which were prize winners of candidate-calls at the national level were all labeled PRIDES as "network head"' of their respective hierarchies; 17 other clusters were identified on a regional level. The labels "pole of competitiveness" and PRIDES are complementary, the first opening access to financing for major projects and the second enabling the needs of SMEs and micro-enterprises to be more precisely met. The PRIDES, today, bring together 2 600 companies reflecting 130 000 jobs. But these networks are open (by design) and are committed to accommodating new SMEs and micro-enterprises, in particular those that make requests for regional development aid.

The economic engagement of companies gradually changed under the influence of this new device and the Regional Network of Innovation, in association, is progressively developing the players committed to this engagement (*Chambres Consulaires*) or to the promotion of innovation (OSEO, INPI, ANACT,…).

The PRIDES are also responsible for enriching the context of activity through companies or associations of specific sectors and via specific goals (for example the association of micro-electronic companies Arcsis, the association of multimedia content companies, MedMultimed, the Sophia-Antipolis based Telecom Valley association,… for the SCS pole). Today, this"'rich" environment is characterised in particular by:

- Programs of R&D carried out in partnership with research laboratories.
- Partnerships between large companies and SMEs.
- The presence of the R&D centres in companies.
- Technological R&D platforms of R&D.
- Capacity to develop new applications, new services.
- An active presence in large international fairs.

Governance for innovation: defining participant roles more systematically

Piedmont's dense RIS has placed limits on the extent to which the new regional government has been able to directly regulate activity. There are very few innovation activities or agencies of which they are in complete control. This creates clear problems of control, as the Regional Government is not in a position to impose solutions on regional actors. This mirrors the more widely recognised shift from government in hierarchies to governance in networks. The issue for Piedmont has been a fragmentation of these networks, and so the Regional Government has sought to create a sense of common purpose and co-ordination between these networks.

This situation reflects the more general style of innovation in Piedmont, where innovation has historically been realised within comparatively small and sealed off innovation networks. Whenever new activities are undertaken, new networks emerge, and there are only substantive links made between networks if there are particular actors who are active in both, and can act as bridges between them. The role of the universities as key bridges in this network is dealt with in the final section of this chapter.

Piedmont is aiming to create a novel regional innovation culture, in which partners are more willing to work coherently together. Part of this culture is characterised by a preference for system knowledge, in which all actors are guided by an acceptance of the need to work towards common goals identified systematically. Building this capacity is characteristic of a number of more successful European regions who have been able to make the transition from industrial region to innovative manufacturing centre.

Changing organisations or changing cultures?

One response of the Regional Government to the complex institutional map has been to make significant changes to the two main organisations which they do directly control, Tecnorete and Finpiemonte. The changes to Finpiemonte have been dealt with elsewhere – Tecnorete has been reformed from a science park management company into an effective regional innovation support agency. One new organisation, Enzima-P, has had to both take over Tecnorete's property management portfolio as well as help to engender a new innovative spirit across the region. The changes which these organisations have gone through illustrate the dilemma facing the Region as it seeks to change the underlying innovation culture within the region.

The mission for Enzima-P is to be a focal point around which the region's science parks are able to converge, and to maximise the industrial benefit from this activity. The science parks are a key site for technology transfers and spin-offs, because this is where many of the region's collaborative innovation projects take place. In order to maximise the benefits arising from collaboration, it is important to have access to funding, intellectual property and business management services in the park itself. In turn, this has justified reinventing the science park organisations as specialist technology transfer agencies for the region encouraging co-operation and interaction between universities and SMEs.

> Enzima-P is a public-private body created to supply high value-added services in the field of innovation in Piedmont using its integrated network of competence, structures and human resources dedicated to fostering innovation; it collects and promotes the most important innovation players, located in the whole regional territory. (Piemonte: here you can, 2007, p. 22).

The central aim for Enzima-P is to act as a medium between innovative actors. In order to achieve this, Enzima-P seeks to speak the language and understand the needs of the full spectrum of innovation actors, and then use that insight to help those institutions build better mutual relationships for the exchange of technology, knowledge and resources. In some cases, this involves acting partly as an advocate for small firms wishing to get involved with or benefit from larger, established collaborations such as I3P or TWF (*qv*).

In this case, Enzima-P seeks to provide a single point of access to the public administrative structure, to increase the numbers of firms that feel that engaging with innovation support activity has a direct relevance for their own competitiveness.

Enzima-P is taking a staged approach to creating this improved innovation bridge, with the first stage in the process being the identification of shared expertise between good innovators and those with a need for their knowledge. The idea is to create systems which can help link the knowledge base and these services, so they are not entirely reliant on fortuitous spin-off from science parks, but are driven by more of a science push. One idea is to develop a survey and tracking instrument for university technologies, which can then be matched with market research to establish demand and identify customer developers who can help bring the idea to the market place.

However, it is clear that higher hopes are invested in the creation of Enzima-P beyond simply creating a single access point to innovation competencies in Piedmont. Because the Regional Government has relatively few institutions which it directly controls, Enzima-P has been vested with a

great deal of symbolic importance as an institution which must make a difference. By adopting a new way of working in the field of innovation, Enzima-P is intended to engender new ways of innovation across the region as a whole. In particular, innovation policy will progress from beyond funding particular activities, to creating the space and the environment under which collaborative innovation can flourish.

Mission drift versus meaningful realignment

As a matter of principle, it is better to avoid unnecessary institutional reform, but the changes which have emerged in the region so far do not appear complete, and require a further round of reorganisation to create a coherent decision-making centre around regional innovation policy. There are four main challenges for the region in order to ensure that there is an effective decision-making system for innovation policy, and equally that reforms to the RIS increase institutional thickness whilst providing the desired level of transparency and openness for the public sector.

The first challenge is that the place of Enzima-P is not yet properly settled within the regional innovation system. In part, this is because of the organisation's two objectives to address two quite distinct problems in the RIS. On the one hand, Enzima-P is seen as a way of helping business better access the existing business support infrastructure, and to create a critical mass of innovation business support centred around the regional science park network. On the other hand, Enzima-P is regarded as a regional innovation platform, a mechanism for building knowledge about regional innovation in Piedmont that can feed into the general policy process.

The second challenge is that the organisation is oddly positioned given these two objectives – it occupies a hybrid position within the RIS which matches neither objective. If it were seen as a business support organisation, then it would be subordinated to Finpiemonte, and have primarily a service delivery role. If it were a regional innovation platform, then it would take decisions about the allocation of funding and projects, and inform the Regional Government and other public stakeholders about appropriate innovation instruments and policies to meet their wishes. This suggests that it is regarded primarily as a service delivery organisation, but more clarity is required before Enzima-P can fulfil its potential.

The third challenge comes in increasing the scope of Enzima-P's activities to encompass services already delivered by other competent actors. The complex nature of the RIS means that Piedmont has many existing partnership organisations delivering business services that form an overlapping "web". This overlap and connectivity means that rationalisation of activities will not be simple, as it is not necessarily clear where

competence lies. However, the existing arrangements appear to be inefficient, resulting in a situation which creates two risks: firstly that caution will continue the waste of public resources, whilst secondly, proactivity may result in the destruction of efficient partnership organisations.

The final challenge lies in the conflict between the particular and the general elements of business support. Enzima-P's aim is to be a regional organisation, but its activities are concentrated in particular locations, and these places have particular sectoral specialisations. This creates tension between creating a local specialised centre of excellence and ensuring that all potential innovative firms in the region have access to innovation support services. There is a risk that if some provinces and municipalities are seen to be favoured by the innovation network, then this will undermine local support for and disrupt the wider Regional Research Plan process.

Although there is uncertainty about the future direction of Enzima-P, this situation provides the opportunity for regional actors to consider more closely what precisely they are hoping to achieve. Enzima-P could form the core of a regional innovation agency, which evolves, in the long-term, into an agency responsible for promoting innovation activities. This would require the defusion of tensions with Finpiemonte, which already has significant competencies in this area. Alternatively, Enzima-P could become the basis of a regional competence centre network which focuses on creating a network of innovative locations where business and firms work together.

There are other regions that have had to deal with these issues, and they have useful lessons for Piedmont. In Flanders, a new innovation agency was created to co-ordinate policy actions across government, operating through a direct contract with the Government itself rather than to a single sponsor department. This has given IWT, the agency, the institutional space to manage itself in a rational manner, and fulfilled the aim of placing innovation at the heart of government policy. In Catalonia, a successful science park in the regional capital, Barcelona, has become the centre of a regional network of competence centres that encompasses 73 technology transfer centres across the region. Both these examples provide illustrations of how Enzima-P could be managed in the future depending on which of the trajectories is tracked by Enzima-P.

A flagship innovation agency

The entire science and innovation policy in Piedmont focuses on attempting to build an effective regional innovation culture in Piedmont. Although historically the region has been home to many innovative businesses, evidence suggests that people do not associate their own occupations with innovation. There have been attempts to address this

through the use of festivals and promotional activities, such as the World Design Capital (*qv*). This aims to address the pessimism which has emerged in some of the manufacturing branches that their outlook is not so bright, and encourage people to invest more in innovation activities. Enzima-P's role as a catalyst agency has to be seen from this perspective, not just encouraging innovation between companies, but contributing to building an innovative regional atmosphere – which can be seen in its support for the *Scientific American* sponsored-edition. Parallels can be drawn with this situation and that in the region of Flanders, Belgium.

Box 5.6. **Building an innovative culture: the case of IWT**

The region of Flanders was dependent on three very different forms of heavy industrial activity which came under pressure from various sources in the late 1970s. The east of the Flanders region[3] (primarily Limburg) had an economy based on coal-extraction, which, from the 1940s onwards, had gradually been replaced by mass-production Fordist assembly industries. The Schelde Delta area (around Antwerp) remained a centre for logistics and transport as well as a global centre of the chemicals industry. South West Flanders retained a strong entrepreneur driven small-firm sector which was highly innovative but constrained in its locality (Oosterlynck, 2007).

From 1980 onwards, the Regional Executive has received increasing policy responsibilities lagged, to some extent, by the resources to pay for those activities. In the first wave of devolution, the Executive had very few resources to invest, and so a great deal of symbolic activity took place, focusing on emphasising the importance of innovation in the everyday life of Flemish residents. Under the heading of "Third Industrial Revolution in Flanders", three flagship industrial research institutes were created. These institutes were created in parallel with the universities, around three spear-point technologies, micro-electronics, biotechnology and new materials, and characterised a top-down approach to innovation policy. Alongside this, a biennial international technology fair, Flanders Technology International (FTI), was arranged to embed a vernacular message centred on the importance of innovation.

The first wave of innovation policy had been focused around stimulating greater involvement by the universities, and from 1990 on, the government shifted emphasis towards greater industrial involvement. A specialist innovation agency was created, IWT (the Flemish Institute for the Encouragement of Innovation through Science and Technology), which initially accorded grants to promote collaborative innovation activity. The limit to this approach came through a reliance on firms to identify their shared problems, which met with varied success. The government therefore mandated IWT to identify systemically ('top-down') which sectoral mobilisations ('bottom up') should be supported to maximise the returns to investment.

Box 5.6. **Building an innovative culture: the case of IWT** (continued)

This created a new role for IWT, as in order to operate as an effective system manager in the interest of firms and universities, and to use top-down regulation to stimulate bottom-up collaboration, a great deal more knowledge about the Flemish RIS was required. This led to the establishment of a dedicated research section within IWT, the Flemish Technology Observatory, now Monitoring & Analysis, in 1997. This was created to generated a detailed knowledge of the Flemish Innovation System to be used for the better design of innovation policy, and the ongoing refinement of existing activities, in Flanders. The M&A section regularly publishes a range of research reports, evaluations of its policies, think-pieces and foresight activities. The key to IWT's success is its critical mass, and the capacity to build synergies between its various tasks, notably between innovation finance and knowledge about the Flemish RIS:

> The IWT makes EUR 250 million available annually through its financing instruments to business, research institutions and innovation actors. Alongside this, a range of services are provided to Flemish businesses, including technology transfer, partner search, preparatory work for Framework proposals etc. The IWT has an important co ordination function which aims at effective co-operation between all Flemish actors interested in innovation. This in turn contributes to the role of the IWT as a knowledge centre for research and development in Flanders. Finally IWT has an important role in terms of the preparation and management of the Flemish government's innovation initiatives.

The post-2005 arrangements have the advantage of being new: there are often problems as activities become mature and politicians seek to do something different. This can be difficult to achieve in the field of innovation without disrupting the networks which have also built up. The existence of a separate innovation agency helps to isolate these potential practical problems from the general support given for the idea of boosting regional innovation. Enzima-P appears to need greater responsibilities and resources if it is to realise its potential to genuinely position itself as the innovation catalyst for Piedmont.

The use of partners' wider networks

There is a clearly articulated objective present in all the changes to the RIS to further internationalise Piedmont's innovation system. The creation of the Centre for Investments, Exports and Tourism from four predecessor bodies underlines the intention to ensure innovation translates into growth through increased international market share. Many of the innovators in Piedmont are well-networked in their own international environments and the question arises whether those international exports are being optimally

exploited by the Research Strategy to enhance the region's overall innovation competitiveness.

Box 5.7. **Exploiting key actors' wider networks: the European Consortium of Innovative Universities**

This is exemplified by the lack of discussion around the potential value of the European Consortium of Innovative Universities as a means of bringing external expertise into the region, or indeed capitalising on that knowledge which already flows into Piedmont through that route. The Polytechnic of Turin is a founding member of the Consortium, a grouping of 11 full and three associate members bringing together technical universities with an interest in promoting entrepreneurship. The universities are distinguished by a problem-solving approach to learning, and by encouraging significant interaction between students and business, exemplified in high levels of income from commercialisation and industrial research.

"Many ECIU institutions are based in regions which have challenged the decline of key industries (*e.g.* shipbuilding, mining) and have made a significant contribution to the economic and social regeneration in these areas. This is evidenced in the close collaboration between research groups and emerging industries and in the fact that ECIU institutions were early and enthusiastic proponents of technology transfer and knowledge exchange activities."

The consortium's membership is:

- Aalborg University (Denmark)
- Universitat Autonoma de Barcelona (Spain)
- Universidade de Aveiro (Portugal)
- Université de Technologie de Compiègne (France)
- Technische Universität Dortmund (Germany)
- Technische Universität Hamburg-Harburg (Germany)
- Linköping universitet (Sweden)
- University of Strathclyde (UK)Politecnico di Torino (Italy)
- Universiteit Twente (Netherlands)
- University of Warwick (UK)

There are three associate members who share the institutional interests of ECIU but are not located in Europe:

- Southern Federal University (Russia)
- Swinburne University of Technology (Australia)
- Tecnológico de Monterrey (Mexico)

Box 5.7. **Exploiting key actors' wider networks: the European Consortium of Innovative Universities** (continued)

ECIU represents a European competence network in the field of knowledge transfer from universities, and the stimulating of university entrepreneurship in comparatively hostile environments for high-technology entrepreneurship. Involvement in this network has helped establish the Polytechnic's own technology transfer activities including I3P and ISMB. There are also opportunities to use this network to further develop activities in Piedmont by drawing on their international expertise in increasing the economic impact of the region's HEIs. Through ECIU, COREP is involved in the DIFUSE project which is also concerned with maximising universities' regional impacts through technology transfer and entrepreneurship. This has compared the practices of the regional universities against that of other comparative institutions.

Source: http://eciu.web.ua.pt/page.asp?pg=7.

Science parks and co-ordination

A key driver for the reconstitution of Tecnoparco as Enzima-P was to move Tecnorete away from being a science park manager, towards a more effective catalyst of regional innovation. Nevertheless, the science park assets remain an important part of the capacities of Enzima-P. The question of interest here is how can a competence base centred around facilities management be extended to transform the organisation into a genuine bridging institution.

Box 5.8. Co-ordinating and spreading best practice in XPACT

A useful example here is the case of the Barcelona Science Park, in Catalonia, which has become the basis for a network of science parks across Catalonia.[4] The situation in Catalonia is similar to Piedmont; although there is a strong and internationalised backbone to the region's manufacturing economy, there is a long underperforming tail of largely small and medium-sized businesses who have proven impervious to attempts to stimulate their innovation.

As with Italy, Spain is also undergoing a long-term process of devolution, and since the 1990s, Catalonia has sought to make the best use of its novel powers around science, technology and innovation to improve its innovation performance. The central issue for Catalonia has been using the universities effectively to stimulate innovation, negotiating between a very absorptive HE sector and a relatively resistant SME sector, and investing versus pump priming.

The origins of the Barcelona Science Park (*Parc Científic de Barcelona, PCB*) lie in a collaborative agreement in 1999 between the University of Barcelona and a bio-incubator sponsored by a Catalan government agency, the Centre for Business Development and Innovation (CIDEM). The idea for the collaboration was to stimulate the University of Barcelona's third mission, to create an "extended development periphery" outside the university, which would also orient individual university researchers and teachers more closely to the needs of universities. In doing this, the Catalan government sought to assert its technological superiority in the Spanish innovation system and position Catalonia to compete more effectively for a larger share of European funding.

PCB is underpinned by four pillars which in turn provide the institutional space within which innovation and knowledge valorisation take place. The four pillars of the project are:

- **Anchor tenants** – a number of public and private research laboratories ensure that the project has financial sustainability. They also increase the attractiveness of the park to other clients.
- **Collaboration –** although the park was the private initiative of the university, its realisation was delivered through close collaboration between anchor tenants, the regional government, an investment bank, and a regional foundation. The PCB Foundation has been set up to ensure that the wishes of the private sector remain important within the governance processes of the PCB.

Providing **innovation services** for businesses to bring them into the science domain (both research services but also incubation). This has been important to create the physical spaces where collaboration around innovation takes place, and prevents the physical development from losing its innovative character, becoming a high-technology business park rather than a place where innovative ideas are exploited commercially.

Box 5.8. **Co-ordinating and spreading best practice in XPACT** (continued)

Linkages with the Catalan "Research and Innovation Plan 2005-2008"; although the idea originally aimed to accelerate the University of Barcelona's technology transfer beyond the outputs achievable by a technology transfer office, the idea was picked up eagerly by regional actors. The University allowed others to share in its good idea, and consequently the "PCB model" has been extended as a way of articulating how the region's universities will contribute to raising the region's innovation performance, sustaining its lead with respect to the rest of Spain.

Better managing and co-ordinating existing networks to improve innovation contributions

Piedmont's RIS has evolved in the last quarter century through the unplanned growth of a range of intermediary and partnership organisations. A major challenge for the Regional Government lies in creating an appropriate framework within which a plurality of organisations, many of whom now fulfil functions for which they were not originally intended, and which can contribute effectively to the RIS. Section 2 of this chapter has explored the way that there have been top-down changes to governance in Piedmont's RIS driven by the Regional Research Law and Research Plan. These have primarily been controlled by the Regional Government.

However, other actors have themselves been attempting to develop new governance and network capacity to position themselves to respond to the new agenda. This process has taken place against a background of institutional complexity and fragmentation. Developing new governance has taken place within networks of networks, which has provided both useful overlap and the capacity for mobilising new activities, as well as limiting the radical nature of what can be achieved.

There are a number of these institutions which contribute to the promotion of innovative activity by bringing together members from different innovation sub-systems in Piedmont. These organisations include:

Table 5.2. **Collaborative innovation organisations in Piedmont**

Organisational abbreviation	Full name (in Italian)	Full name (in English)
CSI Piedmont	Consortio per il Sistema Informativo Piemonte	The Piedmont Consortium for Information Systems
CSP	Centro di Eccellenza per la Ricerca, Sviluppo e Sperimentazione di Tecnologie Avanzate Informatiche e Telematiche	Centre for Excellence in Research, Development, and Experimentation of Advanced Computer and Telecommunication Technologies
SITI	Istituto Superiore sui Sistemi Territoriali per l'Innovazione	Higher Institute on Territorial Systems for Innovation
ISMB	Istituto Superiore Mario Boella	Mario Boella Higher Institute
COREP	Consorzio per la Ricerca e l'Educazione Permanente	The Standing Consortium for Education and Research

Source: Finpiemonte Background Report (2008).

The Research Plan has attempted to change the behaviour of regional actors to increase the tendency towards collaborative innovation promotion in the region. This is not something for which the Regional Government can directly legislate, nor, given the relatively small volume of resources available, can actors be directly encouraged to change their behaviour. This situation is complicated by the existence of hybrid public-private institutions which have their own institutional logic as well as relationships with their original founding organisations.

A large part of the success of the Research Plan hangs on how successfully these organisations choose to reconfigure themselves. One element of this involves the commitment to re-inventing the institution to take account of new situations (internal change). A second element of this change involves accepting new tasks and shedding unsuitable tasks in the light of the evolving RIS. A third element is the necessity to share experience and knowledge with the top-level RIS overseers, to ensure that RIS policy evolves as intelligently as possible.

There are a number of partnership organisations in Piedmont which have evolved over the last decade or so, and the outcomes of this evolution will significantly influence the success, or otherwise, of the Regional Research Plan. One of the oldest partnership organisations is COREP, the Standing Consortium for Education and Research, which is a partnership of regional institutions seeking to improve their regional impact. COREP has established itself institutionally and itself become a promoter of projects and activities. This experience is valuable in understanding the encouragement of a wider systemic shift.

Improving HE's contribution to innovation

There is increasing recognition of the importance of higher education to the promotion of innovation, and correspondingly a growing importance of universities' regional roles. University involvement in innovation is not a simplistic process, but requires commitment by HEIs at the highest level to participating in innovation processes. This means that universities do not just create technology transfer offices, but that they actively participate as partners in regional innovation strategy processes. It is important that they shape the strategy to ensure that they can contribute effectively to that process, and that strategies emerge which create the right incentives for universities to participate.

In recent years, this has been addressed by quite literally building engagement into universities. By funding new physical developments for universities and improving their campuses and laboratories, external partners can also create the spaces where innovation takes place. The science parks of the 1980s and 1990s, where universities were often aloof from commercial concerns, have given way to urban science policy, where coalitions of regional actors come together to rebuild and regenerate cities, using universities as anchor tenants, but also bringing their research partners back into the city in the form of private research and development laboratories and firms.

This change in policy has come with a realisation of universities' potentially strategic economic roles. This realisation has not emerged spontaneously, but emerged as universities have themselves attempted to make innovation significant to their main activities of teaching and research. The shift has been driven in many cases by successful innovation projects which have been used by universities to lobby for an expansion in the way that universities participate in innovation projects.

But HEIs have not just lobbied for these individually – what has been most successful is where universities have come together regionally to articulate for themselves what their regional economic contributions have been. The idea of the Regional Higher Education Association (HEA) has emerged in the last decade as a way of bringing together often very different institutions. HEAs typically assert a common set of contributions that higher education can bring to a region and actively participate as a high-level stakeholder in discussions about the regional innovation strategy. This ensures that universities are not seen as merely pleading special interests, but are coming as an economically significant branch to discuss how, at a high level, to better manage their activities.

Box 5.9. **COREP improving the universities' regional contribution**

The emergence of COREP as a consortium of higher education reflected early attempts to increase the regional contribution of the HE sector in Piedmont. Reflecting the very low general human capital level in the region, there were concerns amongst regional large firms that their competitiveness suffered from the lack of provision of post-experience education and higher level skills. Because this was not a core university activity, it made sense to form a consortium to create appropriate pathways allowing firms to pay for qualifications drawing on existing educational competencies.

COREP's origins lie in a predecessor collaborative project, CSI-Piemonte, which was created to provide access for regional authorities to office automation expertise. Both University and Polytechnic were participants in CSI-Piemonte. In 1986, the CSI board established a specific group considering "Research and Education projects" within the universities. CSI-Piemonte was primarily concerned with the promotion of information-society initiatives, but this group also found more general enthusiasm in the universities for effective collaboration around other regional activities. The availability of EU and Italian government funding for technology transfer provided the resources to fund much of the early activity;[5]

The COREP consortium was initially formed as a co-operative activity between the region and the two universities then present (including the University of Turin's campuses in the east of the region). The COREP consortium has also grown over time to involve 11 main partners, and to see COREP taking a lead in running a wide range of projects of wider regional benefit. The partners now involved in COREP are:

Academic members:

- Politecnico di Torino
- Università degli Studi di Torino
- Università degli Studi del Piemonte Orientale "A. Avogadro"
- CNR – Consiglio Nazionale delle Ricerche

Institutional members:

- The Piedmont Regional Government
- Province of Turin
- City of Turin
- Turin Chamber of Commerce

Private members:

- Unione Industriale di Torino
- Fiat S.p.A.Telecom S.p.A.

This institutional development of COREP is set out in Table 5.3, and makes the more general point that many institutions in Piedmont have grown organically, taking experiments in the public policy field, and then either mainstreaming those projects as core institutional functions (such as post-experience education), or spinning them out into new activities (*e.g.* the I3P innovation centre).

Table 5.3. **The institutional development and growth of the COREP consortium**

Year	Key moment in the growth of COREP
1987	Formation of the COREP consortium
1989	Launch of first shared post-experience qualifications
1994	Begins helping the Polytechnic's activities in Vercelli to undertake technology transfer in Eastern Piedmont (UN.I.VER).
1995	First COREP Innovation centre launched (LAMP) followed by LISIN (1996), LACE (1997), FRAME (2002), LAPO (2003)
1996	Launch of DIADI 2000 – a technology transfer framework to help both targeted sectoral areas and SMEs in Piedmont
1998	COREP works on feasibility study for an incubator for spin-off businesses which becomes I3P
1999	COREP achieves ISO 9001 for the design and supply of education services and is accredited by the Piedmont Regional Government
	Launch by COREP of the Regional Observatory for Universities and Student support

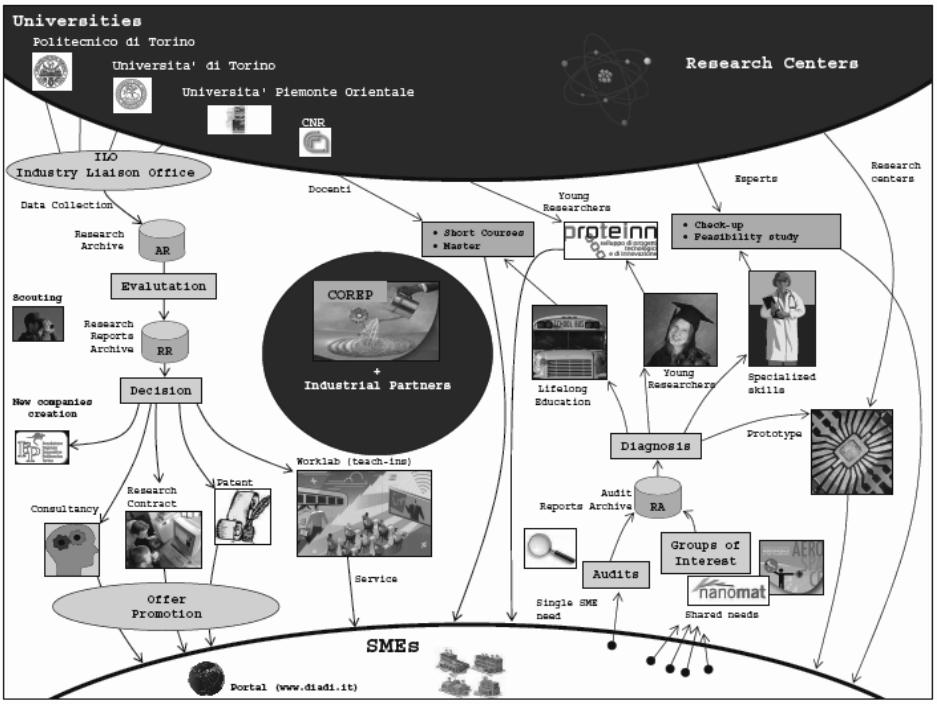
What is interesting is how organisations have proliferated within and beyond the institutional structures which established organisations have established. CSI-Piedmont and COREP work today for example on the "CSP", the Information Society Technologies innovation and research centre for Piedmont's public administrations. CSI, CSP and COREP are partners in the Turin-Piedmont Internet Exchange, along with the region's universities.

Another example of this is the coalition which emerged behind the Regional Cluster Group, Torino Wireless Foundation. This was formed by a range of organisations, when Torino Internazionale invited some of the key regional players including the Piedmont Regional Government, *Instituto Superiore Mario Boella*, the Turin *Unione Industriale* and the Inward Investment Agency. *Instituto Superiore Mario Boella* itself was formed in 2000 to encourage better co-operation between the Polytechnic and the Regional ICT industry.

The potential to improve this co-operation by institutionalising it into ISMB had previously been demonstrated by a range of the collaborative projects supported by COREP, including the I3P incubator feasibility study. Today, I3P, ISMB, and the Polytechnic are developing a shared site in central Turin to improve the commercialisation of knowledge between participating partners, and CSP co-fund the laboratories being developed on this site.

COREP today argues that this proliferation of projects in which it is participating places it at the heart of the regional innovation system, and makes it a strong promoter of suitable new innovation projects.

Figure 5.2. **COREP at the centre of university/ business interaction**



Source: Patrignani (2008), "Knowledge Transfer as a Bridge between Universities' Research and SMEs: The Piemonte's Experience" *DIFUSE Conference*, 27 May 2008, Brussels, Belgium.

Bottom-up governance for regional innovation: Piedmont's technological platforms

To strengthen co-operation between public and private organisations in the commercialisation of near-to-market research, Piedmont has adopted a Technological Platform approach, following the European model. At a European level, the idea of Technology Platforms was strongly supported under the Dutch Presidency (2006) as a means of bringing together strategic stakeholders at a sectoral level to develop sector-specific initiatives and instruments to improve corporate competitiveness and commercialisation capacity. In Piedmont, the idea has been slightly amended to reflect local conditions and the policy framework, focusing on developing coherent

programmes of collaborative research between the public and private sector, leading to calls for projects and funded projects.

The first Technology Platform in Piedmont is now operational and has made a number of awards to eligible projects. Initially established with a budget of EUR 20 million of funding from the regional government, increased with an additional EUR 10 million ERDF, the platform has been established according to a template now being applied across the Platforms. A co-ordinating committee was set up from the leading stakeholders in the region, and they co-ordinated the issuing of the first stakeholder call in 2007, inviting participants to join a Steering Group; this steering group designed a call for projects with a deadline of Feb 2008. Proposed projects were evaluated and then fitted into a coherent Platform programme in negotiation with the Region, with a maximum project budget of EUR 10 million. 13 projects were submitted from consortia including 90 SMEs, 18 university centres, 13 university centres, 11 large firms and five other institutions. Three projects were selected for the first project round, and carried an additional EUR 20 million co-financing, taking the final investment in the first project round to EUR 50 million. Participation in the Platform governance is shown in Figure 5.3.

Figure 5.3 **The formal constitution of the Aerospace technological platform**

Source: Finpiemonte Background Report (2009).

A further four Platforms are at various stages of establishment, following the model pioneered by the Aerospace Technological Platform. The most advanced Platform is the biotechnology platform; the first call (focusing on molecular imaging; regenerative medicine; Immune diagnostics; and Product innovation for rate pathologies) was designed in conjunction with a stakeholder panel, and set a deadline of September 2008 for project proposals. Those proposals were subsequently evaluated with the intention of making a total of EUR 20 million available in project awards. The next most developed Platform is in the field of "Infomobility, Logistics and Sustainable Mobility", in which a Committee was established in March 2008. This committee is currently formulating the basis for a call for proposals. Finally, there are calls for stakeholders to participate in two new committees in the field of agro-food and multi-media and technology.

The use of Technological Platforms is an attempt to consolidate and extend existing activities, within the prevailing Plan principle of external evaluation. The Platform principle has been effective in encouraging the universities to participate in proposing shared near-to-market commercialisation projects in the field of aerospace. The comparative institutional success of the establishment of the aerospace platform has in turn provided a rationale for expanding the approach into new technological fields. The Platform approach as it has so far developed has effectively allowed the Regional Government to concentrate resources in particular niche areas without necessarily having to over-specify the detail of the projects to be funded.

The Technological Platform approach is undoubtedly a long-term attempt to create dedicated expertise in managing commercialisation in a particular technological niche. The Technological Platforms are only now being set up and this makes drawing definitive conclusions from their outcomes very difficult. However, the experience so far does raise a number of issues for the Regional Government in seeking to ensure that its investments maximise the building-up of the Piedmont RIS. Given that one longstanding problem in the RIS is a proliferation of innovation support activities, the success of Platforms will depend on how effectively their innovating firms can access innovation business support. A further question can be raised as to learning between the Platforms, and in particular, how are the later Platforms learning from the experience of the Aerospace Platform, and under what conditions can lessons from one sector be transferred to another. These do not specifically criticise the approach, but they highlight the difficulties of introducing a new approach to stimulating business innovation in a region which already has a very institutionally thick innovation system.

This encapsulates many of the dilemmas which emerge for a Regional Government when trying to provide steering to a RIS as complex as that of

Piedmont. There is a great degree of duplication, and there is an implicit hierarchy in decision making that is not always reflected in the formal governance arrangements. However, it is important to emphasise that this arrangement works, although its efficiency and transparency can be questioned. New institutions can potentially capitalise on existing activities, and it is necessary to identify where there is genuine innovation support capacity to further extend. Of course, some new capacity will emerge in earlier Platforms which may be available for the benefit of later platforms. Effective RIS management requires effective knowledge about the RIS and key business support organisations to ensure successful co-ordination.

Exploiting diffuse innovation knowledge: the enabling development model

A distinguishing feature of the situation in Piedmont is the large number of intermediary institutions with detailed knowledge about the regional innovation system. This creates real problems for the policy makers responsible for innovation, and as has been seen in Piedmont, can hinder effective co-ordination of the activities as a coherent system.

One region which has very successfully addressed this is Tampere, Finland, which developed what it called the "enabling development" model for strategy building. This emphasises strategy-makers' roles in joining up the various innovation support activities within the RIS. Rather than deciding a conceptual approach to regional innovation and restricting support to activities which fit that approach, the strategy is designed from a deep understanding of regional capacity to support innovation, and attempts to increase the scope, coverage and impact of existing expertise.

The question is whether the introduction of an enabling development model would lead to a significant change in Piedmont. The implementation involves both building knowledge about innovation actors in a single strategic organisation, as well as actively involving those actors in the development of that strategy. This represents a subtle shift in the nature of governance, away from coercing and motivating activity, to building a broad coalition with diffuse expert knowledge on particular activities.

Box 5.10. **The enabling development model in Tampere, Finland**

In the early 1990s, the newly-created Finland National Technology Agency (TEKES) launched a Centres of Excellence programme investing in regional technology strengths. Tampere's programme was based on three strands, mechanical engineering/automation, ICT and healthcare, reflecting its proven commercialisation success with its science park. The attraction of a Nokia R&D centre, employing 4 000 engineers and with close links to the university, underscores the many kinds of success which followed, successfully attracting the two universities to the region. This made the region visible to national policy makers, who used their Centre of Excellence programme to invest in the region. Alongside the three nationally-mandated centres, Tampere also decided to support a fourth centre, in the field of businesses services despite TEKES initially arguing that it was not a centre of excellence (it subsequently reversed its position when the scheme was amended in 2002).

In 2003, Tampere decided to develop its entire regional innovation strategy on the basis of what had been learned from the four regional centres of excellence. The key issue was how to build upon learning and expertise in the existing agencies, re-organising them to sit within "centre of excellence" based framework without imposing a one-size-fits-all approach. The strategy identified different kinds of development agency serving different aims. These aims were diverse, covering sectoral centres (for healthcare, business services and new media), facilities provision centres (conference tourism, business parks) and services for businesses (seed capital, venture capital, technology transfer, and business advice).

Tampere City termed this approach the enabling development model; specialised agencies sat alongside a regional partnership developing the overall strategy. The two elements would develop along a common path together by drawing together two types of organisation which already had their own operational models. Specialised agencies were used to create new innovation activities strategically steered by a high-level innovation strategy. The high-level strategy (using past successes as best practise examples) helped to update the Tampere innovators' theoretical models.

Creating a coherent voice for the region's universities

The second issue for Piedmont is the potential existence of a sectoral representative organisation for the region's three universities. COREP has no mandate to act in such a way because it has a range of participating members. Consequently, there is no single organisation which is responsible for understanding how universities are contributing in total to the support for innovation in the region. Discussions take place on a pan-institution or pan project basis in some sectors. For example, there is an understanding between

Confindustria Piemonte and *Unioncamere Piemonte* of what the innovation issues for business are, there is no corresponding sectoral group voicing university interests.

Box 5.11. **Knowledge house in the North East of England**

One example of where a "project" has developed into a collective regional voice for higher education participating in debates around their contribution to systemic regional innovation can be seen in the case of the North East of England. 25 years ago, a tiny ERDF-funded project was set up providing one consultant with the resources to help firms access university knowledge, at a time when such a move was considered potentially controversial. This office was known as Higher Education Support for Industry In the North (HESIN). The project successfully won funding from a Research Council to develop a post-experience manufacturing Masters' degree jointly awarded between the region's five HEIs (none of which at that time offered an MBA programme).

In 1995, a further development occurred when the regional prefecture insisted that the five HEIs put together a common bid for European funding. HESIN provided a means to co-ordinate between the regional institutions, and a senior manager from each institution was appointed to the executive committee. In 1996, one of the ERDF-funded projects involved further collective action between the universities; Knowledge House was established as a brokerage and single contact point where SMEs could bring technical questions, and subject to them passing a suitability test, Knowledge House would guarantee a response from a university academic.

In 1999, the English regions received new regional bodies, regional development agencies (RDAs). In discussions mediated through HESIN, the regional universities decided they needed a common voice for the universities. HESIN was reconstituted as "Universities for the North East (UNE)", with its executive committee formed from the Vice Chancellors of the five regional universities. The involvement of senior managers has allowed UNE to conclude agreements with third parties that also represent agreements with the member institutions. This is a very powerful possibility which has cemented UNE's position within the North Eastern RIS.

UNE immediately involved itself in the drafting of the first Regional Economic Strategy, writing the chapter which became B4, "Putting universities at the heart of the North East economy". From that point, UNE established itself as a key strategic actor, participating in consultations and strategic reviews, representing the views of its membership and allowing actors to work strategically with higher education. UNE operates through a series of committees which draw together the managers in the five universities responsible for particular areas; there is a mix of mission-based committees (research, teaching, engagement) and thematic committees (culture, Widening Participation, sport).

There are clear differences between the North East of England and Piedmont, not least in the fact that the very low number of innovators in the North East has compelled regional partners to work with the universities in seeking to develop an innovation policy. Nevertheless, there are similarities, in having a number of large, research intensive and technically based universities with the clear potential to make economic contributions to the region through innovation. The shift from HESIN to UNE represented a shift from one-off contributions to creating a representative organisation. Regional partners had long been seeking a voice for the higher education sector, and so UNE has quickly been able to make a considerable difference.

Improving transparency between responsibilities

The compelling rationale for the introduction of the law was a rationalisation of innovation support for businesses in Piedmont. The goal was to eliminate the dependence of outcome from the business support system from the point at which the system was approached. The idea has been to create a system in which regardless of whether a firm approaches a university, the Chamber of Commerce, or a science park, they will ultimately receive the best assistance to which they are entitled. This is a long-term goal, and the DIADI project established by COREP as well as the European Relay Centre of *Unioncamere* were both previous attempts to address the apparent confusion within the innovation system. This signposting and referring between activities is one element that does not appear to have been addressed adequately in the regional innovation strategy. There is no clear Regional Innovation Agency which helps businesses to access the services available.

There are organisations within the universities and some of the public and private research laboratories which have business development managers responsible for working with firms with requests. With the Dutch system, the advantage is that rather than the firm being signposted to a university directly, the Systems advisor helps the firm to formulate their research question in the most suitable way, then identify the right knowledge institute, along with someone that can help them work directly with the advisers. Through a series of interactions between firms and universities, the advisors learn about the business of knowledge transfer, and this improves the support they are able to give businesses seeking assistance.

Box 5.12. **Non-institutional solutions to innovation support signposting: the SME project in Twente, the Netherlands**

In the Netherlands, Syntens, the national innovation agency, exists specifically to help firms access innovation support services. The Dutch Ministry for Economic Affairs has recently been experimenting with creating systematic linkages through their innovation advisors between universities and firms. The key issue for a national innovation agency is how to advise SMEs to access knowledge sources of which the advisors themselves may be unaware .The solution in the "MKB" (SME) project has been to create a second link in the chain to innovation support services, but a link accessed via the Syntens advisor.

The second link is accessed by developing a "knowledge exchange community" between local Syntens advisers within Syntens as well as business development managers within the universities, public research centres, spin-off companies and research intensive companies. This means that a company with a request for knowledge is passed along by a business advisor to someone within the knowledge institute (university etc) who can further guide them onwards (Jongbloed & Van der Sijde, 2008). Once they have found a suitable knowledge source, a EUR 7 500 innovation voucher subsidy is available to pay for the knowledge provider to draft an answer to meet the knowledge demand from the SME.

Harnessing partner expertise in RIS development

Piedmont clearly suffers from too many innovation facilitators, and a wide range of expertises and competencies in the field of innovation. For universities, this is further diffused by the fact that these competencies are themselves diffused across a range of partnership projects (such as DIADI and I3P). COREP has also been involved in creating a knowledge centre on the impacts of students through the regional higher education observatory. There is clearly scope for a body which can capture all this information about universities and universities' contributions and integrate them into the ongoing discussions around innovation policy.

Nevertheless, COREP is developing some of the features which may allow it to position itself as a strategic body mediating HEI involvement in the RIS. COREP is not strictly speaking a purely HEI body, but involves regional and sub regional authorities, firms and business representative organisations. However, COREP has successfully delivered a number of public-private partnership projects in which universities and firms have worked together successfully to promote innovation and productivity gains. COREP is clearly a repository of knowledge about maximising the impacts of universities on Piedmont's regional economy.

The critical question here is what exactly the relationships are with the other bodies possessing strategic knowledge about innovation in Piedmont, and how might COREP interact with those bodies. There are other bodies which have different specific knowledge about other dimensions of the regional innovation system: the Regional Observatory (*Osservatorio regionale per l'Università e per il Diritto allo studio universitario*) is expert in the field of human capital promotion within the higher education system, and how universities are contributing to that activity.

There is a strong case for building better connections between the institutions which have knowledge about innovation in Piedmont and those responsible for decision making within the RIS; as already stated, Enzima-P is regarded as a high-level Regional Innovation Platform, a task shared with Rethink. One way to exploit the knowledge held within these bodies would be to create a series of committees within the Platform aligned with the five priorities of the Research Plan.

These committees would differ from the statutory committees in the Research Plan in having a purely informative role. They would bring together expert "development agencies" such as COREP, the Regional Observatory, I3P and Enzima-P, which have detailed specific knowledge about the impacts of the implementation of the Research Plan. They would also involve key innovation leaders responsible for the main flagship projects addressing each of those areas, to integrate detailed knowledge about particular instruments into the general opinion.

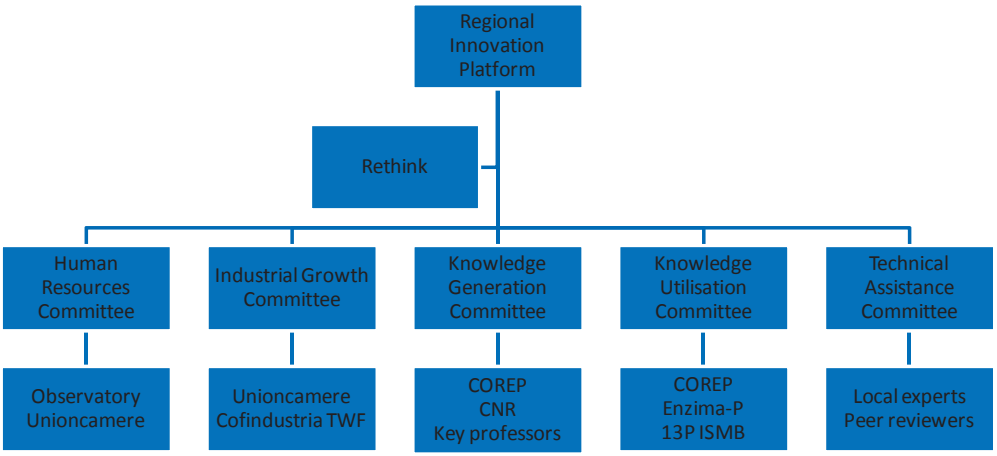
A potential configuration for such a Regional Innovation Platform is outlined below, along with an indication of the kinds of actors that could potentially be involved. It is vital that the knowledge transfer committee involves those with the experience of supporting knowledge transfer between universities and firms (certainly including COREP). It must be stressed that what is important is the formalisation of flows of knowledge between particular groups, which is something that is almost certainly happening already (as demonstrated by the degree of continuity in regional innovation policy), as well as securing the position of these expert actors in the forums where the future direction of Piedmont's innovation policy is being debated.

Box 5.13. An innovation platforma as a co-ordinating mechanism: the case of Scania

In the Scania region of Sweden, the Regional Growth Plan (*Tillväxtprogramma*), which is agreed with the central government. An executive Regional Administrative Board oversees Scania, and has three divisions, regional development, community care and property management. The regional development division is responsible for drawing up the Regional Growth Programme (2005-07) for agreement with Stockholm, and the long-term Regional Development Programme for Scania (2004-12). It has a total budget of SEK 95 million (EUR 10 million), of which SEK 75 million (EUR 8 million) comes from the region, with the remainder coming from the national government.

The RTP is one of the key mechanisms for promoting regional development in Scania, and the partnerships through which it operates are a key regional governance mechanism. The RTP operates through an overarching board, bringing together around 25 bodies, including HEIs, sub-regional partnerships, unions, business organisations, municipality representative organisations and a number of other social partners. Sub-boards assemble the programmes which constitute the programme chapters: as part of this there was an innovation sub-board, which includes the university, the region, municipalities, sub-regions, and social partners. The RTPs have identified a number of clusters for the programme to support, including film-making, biotech, ICT, food, and strategic approaches. However, it remains to individual partners to propose programmes for funding under the RTP itself.

Figure 5.4. **A conceptual regional innovation platform exploiting Piedmont's existing knowledge base**



The essence of this configuration is to bring together experts and have current decision making informed by best practice. Such an arrangement could also act as a co-ordinating measure to help align diverse actors around the programme by being a decision-making forum for funding decisions.

Notes

1 Eurostat regional statistics, science and technology (*http://epp.eurostat.ec.europa.eu*).

2 Information were taken from: Wirtschaftsministerium Baden-Württemberg and Ministerium für Wissenschaft, Forschung und Kunst Baden-Württemberg (2008): *Eckpunkte der Innovations – und Technologiepolitik des Wirtschafts – und des Wissenschaftsministeriums Baden-Württemberg*. Stuttgart; different internet sources from *www.innovation.nrw.de*; Koschatzky, Knut; Frietsch, Rainer; Jappe, Arlette; Lo, Vivien; Stahlecker, Thomas; Zenker, Andrea (2004): *Innovations – und Zukunftspotenziale Nordrhein-Westfalens. Struktur und Dynamik von Wirtschaft, Wissenschaft und Bildung*. Endbericht für die Landtagsfraktion der CDU in Nordrhein-Westfalen. Karlsruhe: Fraunhofer ISI.

3 This construction is used because as well as referring to the NUTS-1 region and the territory represented by the Flemish Community (Gemeenschap) and Administration (Gewest), of the five provinces (NUTS 2 regions) in Region Flanders, there are two which are also called Flanders, (East and West Flanders) and 'Flanders' can also be referred to used to refer to these two regions; Limburg is in the East of Region Flanders, but to the east of the East Flanders.

4 The information here has been drawn from a number of sources, including Benneworth (2007), Hodgson & Charles (2007) and the following on-line best practice guide:-*http://ec.europa.eu/regional_policy /cooperation/interregional/ecochange/goodpractice/1knowledge/3ideas/es _catalonia_barcelona.pdf.*

5 *http://www.sweetsnet.org/nn_flash/english/corep.html*.

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