OECD Regional Development Working Papers 2013/22

The Case of the Top Technology Region/ Eindhoven-Leuven-Aachen Triangle (TTR-ELAt) – Regions and Innovation: Collaborating Across Borders

Claire Nauwelaers,

Karen Maguire,

Giulia Ajmone Marsan

https://dx.doi.org/10.1787/5k3xv0lg3hf5-en

OECD

OECD REGIONAL DEVELOPMENT WORKING PAPERS

This series is designed to make available to a wider readership selected studies on regional development issues prepared for use within the OECD. Authorship is usually collective, but principal authors are named. The papers are generally available only in their original language English or French with a summary in the other if available.

The opinions expressed in these papers are the sole responsibility of the author(s) and do not necessarily reflect those of the OECD or the governments of its member countries.

Comment on the series is welcome, and should be sent to either gov.contact@oecd.org or the Public Governance and Territorial Development Directorate, 2, rue André Pascal, 75775 PARIS CEDEX 16, France.

OECD Regional Development Working Papers are published on
http://www.oecd.org/gov/regional/workingpapers

Applications for permission to reproduce or translate all or part of this material should be made to: OECD Publishing, rights@oecd.org or by fax 33 1 45 24 99 30.

© OECD 2013

ABSTRACT

The Top Technology Region/Eindhoven-Leuven-Aachen triangle (TTR-ELAt) is an initiative to support cross-border collaboration in a densely populated network of small and medium-sized cities located at the heart of western Europe with an annual economic output of USD 244 billion. The collaboration spans three countries, four science and technology policy regimes and six sub-regions. The collaboration centres on a shared recognition of technological strengths (chemicals and advanced materials, high-tech systems and health sciences). The area seeks to better capitalise on its skilled workforce, multinational enterprises and strong research facilities. While building on decades of cross-border activities, the TTR-ELAt seeks to overcome cumbersome governance issues to create the benefits of agglomeration with complementarity expertise so as to increase international attractiveness. This case study is part of the project *Regions and Innovation: Collaborating Across Borders*. A summary of this working paper appears in a report of the same name.

JEL classification: L52, L53, O14, O18, O38, R11, R58

Keywords: regional development, regional growth, innovation, regional innovation, regional innovation strategy, science and technology, cross-border, Belgium, Germany, Netherlands, Eindhoven, Leuven, Aachen, Liège, Maastricht, Hasselt, Top Technology Region

ACKNOWLEDGEMENTS

This case study is part of the OECD project *Regions and Innovation: Collaborating Across Borders*. It is based on a background report prepared by René Wintjes (UNU-MERIT, Maastricht University), with contributions from the working group of the Top Technology Region/Eindhoven-Leuven-Aachen Triangle (TTR-ELAt) as well as on additional desk research and a mission to the cross-border area 13-15 March 2013. Peer reviewers for this mission were from the cross-border areas of the Oresund (Malene Baunsgaard, Magnus Jörgel, Maria Lindbom and Jacob Øster) and Helsinki-Tallinn (Merle Krigul and Katri-Liis Lepik). This case study was drafted by Claire Nauwelaers (expert in STI policy) and Karen Maguire (OECD Secretariat) with additional support from Giulia Ajmone Marsan (OECD Secretariat). The team thanks those who participated in the mission interviews, the peer reviewers, and, from TTR-ELAt, Jean Severijns (co-ordinator), and Dirk Plees (Province of Limburg, Netherlands), Peter Dhondt and Sus Bergmans (Province of Flemish Brabant, Belgium), Ralf Meyer (AGIT Regional Development Agency, Aachen, Germany) Matthijs Korzilius and Bjorn Koopmans (Province of Belgian Limburg and Euregio Meuse-Rhine), Monique Rover and Aylin Coldu (SPI, Province of Liège, Belgium) and Sebastien Muller (Province of Liege, Belgium), Anne Verhaag and Thomas Voncken (Brainport Eindhoven and SRE, South East part Province of North Brabant) and Marnix Muller (Ministry of Economic Affairs, the Netherlands).

TABLE OF CONTENTS

EXECUTIVE SUMMARY 6

INTRODUCTION 11

CHAPTER 1 THE TOP TECHNOLOGY REGION-ELAT CROSS-BORDER AREA AS A FUNCTIONAL REGION 12

1.1. Spatial definition of the cross-border area 12
1.2. Key economic characteristics of the cross-border area 14
1.3. Innovation potential of the cross-border area 17
1.4. Functionality of the cross-border area 22

CHAPTER 2 DRIVING FORCE AND KEY ACTORS FOR THE TOP TECHNOLOGY REGION-ELAT CROSS-BORDER AREA 26

2.1. Rationale for the establishment of the cross-border area 26
2.2. Role of key actors in the cross-border area establishment and evolution 27
2.3. Barriers for cross-border co-operation linked to actors 28

CHAPTER 3 GOVERNANCE OF THE TOP TECHNOLOGY REGION-ELAT CROSS-BORDER AREA 29

3.1. Vision for the cross-border area 30
3.2. Institutionalisation and multi-level governance of cross-border co-operation 31
3.3. Funding for cross-border co-operation 34
3.4. Barriers for cross-border co-operation linked to governance and funding issues 37

CHAPTER 4 TOP TECHNOLOGY REGION-ELAT CROSS-BORDER INNOVATION POLICY MIX ... 38

4.1. Cross-border initiatives and policy instruments 38
4.2. Untapped potential for promoting cross-border innovation synergies 41
4.3. Relevance and effectiveness of the policy mix for cross-border co-operation 45

CHAPTER 5 RECOMMENDATIONS FOR CROSS-BORDER INNOVATION POLICY IN THE TOP TECHNOLOGY REGION-ELAT 46

5.1. Cross-border area 46
5.2. Governance 48
5.3. Innovation policies and instruments 50

REFERENCES 52

Tables

Table 1.1. Snapshot of the functional region for innovation 12
Table 1.2. Size of the TTR-ELAt 14
Table 1.3. Key economic indicators for the TTR-ELAt and its regions 16
Table 1.4. Innovation overview of the cross-border area 17
Table 1.5. Key innovation actors in TTR-ELAt 19
Table 1.6. Selected clusters and technology specialisations in the TTR-ELAt 22
Table 2.1. Snapshot of the rationale and its relevance for cross-border collaboration 26
Table 3.1. Snapshot of governance characteristics 29
Table 4.1. Cross-border policy instruments in the TTR-ELAt 38
Table 4.2. Snapshot of the innovation policy approach 45

Figures

Figure 0.1. Top Technology Region-Eindhoven Leuven Aachen Triangle 11
Figure 1.1. Geographic coverage of the Top Technology Region/Eindhoven-Leuven-Aachen Triangle 13
Figure 1.2. Interreg cross-border areas overlapping with the TTR-ELAt 13
Figure 1.3. GDP per capita in the TTR-ELAt's regions and peers (1999-2009) 15
Figure 1.4. GDP per capita in the TTR-ELAt: International comparison (2011) 15
Figure 1.5. Unemployment rates in the TTR-ELAt's regions and peers 16
Figure 1.6. TTR-ELAt patenting in international comparison 18
Figure 1.7. TTR-ELAt Technological Competitiveness Index in three high-tech sectors 21
Figure 3.1. 2010 Action plan for the TTR-ELAt 30

Boxes

Box 1.1. Facts on the technology-intensive character of the TTR-ELAt 19
Box 1.2. Cross-border data portals and analyses: Oresund and Ireland-Northern Ireland (U.K.) 23
Box 1.3. Cross-border science and industrial park: Chemelot (chemicals) 24
Box 1.4. The BiELAt Foundation: Connecting entrepreneurs in three countries 25
Box 3.1. Cross-border dimension at the heart of the Brainport 2020 Strategy (Southeast Netherlands) . 31
Box 3.2. Cross-border regional development agency collaboration: LIOF and AGIT 33
Box 3.3. InterTradeIreland: A unique cross-border economic promotion agency 34
Box 3.4. Interreg programmes in the area of the TTR-ELAt 35
Box 3.5. Good practices in designing and implementing the Interreg A programme in the Oresund 36
Box 4.1. Top Technology Clusters and the GCS (Cross-border Cluster Stimulation Fund) 39
Box 4.2. Holst Centre: A joint research centre between the Netherlands and Flanders (Belgium) 40
Box 4.3. Transnational University Co-operation in the TTR-ELAt 41
Box 4.4. Joint Finnish-Swedish research programme in wood material science and engineering 42
Box 4.5. Cross-border potential in the agro-food sector: Ireland-Northern Ireland (United Kingdom) .. 43
Box 4.6. Promoting start-ups: Examples from the Helsinki-Tallinn cross-border area 44
Box 4.7. HALO Business Angel Network (HBAN) 44

EXECUTIVE SUMMARY

Strengths, weaknesses, opportunities and threats for cross-border innovation policy in TTR-ELAt

Strengths/assets	Weakness/barriers
– Network of well-connected cities and regions of 8 million inhabitants at the heart of Europe – Significant innovation and research assets and strong innovation performance throughout the area – Similarities in areas of technology specialisation as well as opportunities for complementary expertise – Large share of workforce with skilled human capital – Presence of leading multinational firms and research centres favouring cross-border S&T flows and open innovation practices (i.e. Philips, Imec) – Active collaboration among firms, the public sector and research institutions in different science parks and campuses ("triple helix" in action) – Long history of public cross-border collaboration in the area – Diverse set of cross-border initiatives with several good practice examples (i.e. Holst Center, TTC/GCS projects) – Commitment of many partners to develop the cross-border area (including Dutch national authorities)	– Lack of a large and globally prominent city – Relative peripherality of many cross-border constituent regions in their national political and economic contexts – Unclear branding strategy with competing definitions for the cross-border area – Insufficient awareness of potential across borders, especially for SMEs – Complex multi-level governance structure of the three countries, four S&T regimes and six active partner regions – Different degrees of institutional powers for innovation policy among constituent regions – Weak institutionalisation and unbalanced political commitment among regions limiting policy momentum – Limited funding for cross-border activities beyond European Territorial Co-operation (Interreg) – Regulatory and language barriers hindering labour market flows and business contacts – Lack of data about cross-border relations and flows
Opportunities	**Threats**
– Availability of government funding at higher levels for innovation in general – Greater mainstreaming of cross-border dimension in policies of constituent regions and their national governments or flexibility for alignment (i.e. virtual pots) – Developing a globally recognised cross-border area brand that improves external (and internal) visibility	– Job reductions in certain areas of production, such as by multinationals, due to increasing cost competitiveness of other locations – Increasing difficulty in retaining and attracting high-skilled talent relative to other locations – Funding sources render collaboration more difficult with relevant stakeholders near but outside the TTR-ELAt perimeter

The profile and relevance of the TTR-ELAt as a functional region for innovation

The TTR-ELAt (Top Technology Region/ Eindhoven-Leuven-Aachen Triangle) gathers six regions located at the intersection of Germany, the Netherlands and Belgium. The TTR-ELAt cross-border area has many assets to thrive as a strong hub in the global knowledge-based economy. The TTR-ELAt is a dense cross-border area of over 8 million inhabitants, including multiple city and regional growth poles. Most of the member regions have completed their successful transition from declining traditional industries, such as coal mining and steel industries, towards higher value-added and knowledge-based industries and services. Today, several of these regions are among the "innovation leaders" group of regions within Europe. The TTR-ELAt hosts a highly educated workforce and many innovative firms, universities and research institutions, some of which are niche players of international excellence. Philips in Eindhoven, other large R&D-intensive multinationals, and the IMEC research centre in Leuven are

among the leading actors in supporting the high-tech orientation and open innovation practices in the TTR-ELAt area. Industrial campuses and science parks promote interaction among firms, research centres and universities, and the public sector ("triple helix" activity) serving as strong nodes throughout the area for innovation-driven growth. With this density of actors located within a radius of 100 kilometres, travel for face-to-face meetings can take place within a day, supporting functionality from an innovation perspective.

The constituent regions of the TTR-ELAt have a strong and balanced potential for innovation, building on similarities and complementarities in high-technology specialisations. Areas of particular strength include chemicals and advanced materials, high-tech systems and health sciences. Even more interesting, this combination of expertise gives rise to opportunities at the intersection of these domains thanks to the pervasive use of ICT and other technologies of wide application. Naturally occurring linkages throughout the area follow a variable geometry, as not all sub-regions are as strong in all TTR-ELAt fields of expertise and most cross-border activities are bilateral between two TTR-ELAt partner regions, not multilateral across all partners.

There remain barriers for the TTR-ELAt to capture the full innovation potential of its resources. Competing definitions for the area (TTR-ELAt, Euregio Meuse-Rhine) and weak branding limit its internal and external recognition as a functional and innovation-intensive cross-border area. The region needs to raise its profile to attract and retain talent, a core resource for this knowledge-based cross-border area. Language and cultural differences continue to play a role in hampering the cross-border flows among some of the constituent regions. There is still a lack of awareness of the assets and actors present on the other side of the border, limiting the benefits of the large and diverse asset base. Highly complex governance issues also limit the potential to capitalise on cross-border resources.

Driving forces and key actors for the TTR-ELAt

There is a long history of cross-border co-operation in the area, with economies of scale (critical mass) and scope (exploiting knowledge complementarities) being the main rationales for the TTR-ELAt's efforts. A core idea for building the TTR-ELAt was to enhance critical mass in this network of regions and cities to better compete with large metropolitan areas. Sources of economies of scale for the cross-border area include: combining public resources for efficiency of investment, larger labour markets, and access to wider business and knowledge networks. Exploiting complementarities through economies of scope is a more recent but promising rationale in their collaboration, and one of the unique sources of competitiveness of this cross-border area still facing some deindustrialisation and delocalisation threats. Actors in the region can build on the diversity of assets in terms of research, technologies, economic base and supply chain linkages. The region has indeed considerable potential to find new combinations of complementary knowledge, expertise, skills, infrastructure and funding sources in order to develop new niches of knowledge-based activities.

While historically cross-border collaboration in the area has focused on solving border problems for local authorities, a shift towards an innovation focus requires some changes. The creation of the Euregio Meuse-Rhine, like other cross-border efforts at the time, was intended to promote greater flows of people, goods and services by addressing border-related barriers. For the TTR-ELAt, an additional collaboration effort complementing the Euregio, the primary focus is improving technology and innovation capacity and linkages throughout the area to better compete globally. This shift also changes the role of key actors in cross-border collaboration, with firms and knowledge institutions taking on a more prominent role for policy action.

Governance of the TTR-ELAt

The TTR-ELAt's cross-border governance is complicated by the number of sub-regions and imbalances in both policy competences and political commitment. The governance of the TTR-ELAt is by nature complex with regard to its composition: three countries, four S&T policy regimes and six active partner regions with different sets of competences in innovation policy. The Dutch side of the TTR-ELAt appears to be the leader of the cross-border region from a public governance perspective. The Dutch national government is a supporter of the concept and contributes to cross-border efforts in terms of leadership and public funding. The government of North Rhine-Westphalia (Germany) has recognised the value of cross-border co-operation in innovation, and thus the Aachen region participates in the TTR-ELAt. The Flemish provinces are active followers in the TTR-ELAt. The political commitment of the Province of Liège (Wallonia) to the cross-border efforts requires some clarification. A seventh region in Germany has chosen not to participate yet. More active engagement of the regional authorities is needed in Belgium (Wallonia and Flanders), as well as a (re)-engagement of North Rhine-Westphalia, given their extensive responsibilities for innovation policy that the participant TTR-ELAt areas in their regions do not have.

The absence of a permanent co-ordinating body with dedicated resources hinders the strategic development of the TTR-ELAt. Partner regions have all developed an innovation strategy, or at least regional development policies incorporating the innovation dimension. Common sectors and horizontal actions for cross-border work have been identified, but this is not part of a cross-border strategy. Current co-ordination efforts rely on the good will of a few public sector employees who can dedicate only a small and decreasing share of their time to promote this cross-border collaboration. There are many bilateral projects along different axes within the cross-border area based on identified opportunities. A co-operation agreement between two regional development agencies is an example of a pilot that could be tested in other parts of the cross-border area. However, some of the broader common good functions associated with cross-border governance require greater common efforts. The European Territorial Co-operation (Interreg) programmes are the main funding sources for multilateral cross-border policy instruments and play a key role in catalysing the cross-border efforts. However, their fragmented, project-driven approach is not complemented by a strategy to ensure alignment with other regional/national/EU policies in the regions. The European Territorial Co-operation (Interreg) intervention area was designed with the goal of solving localised border issues, and in the case of the Euregio Meuse-Rhine, the geographic coverage is less adapted to innovation promotion than the TTR-ELAt.

The TTR-ELAt cross-border innovation policy mix

The TTR-ELAt is quite advanced in developing a mix of policies to take advantage of the innovation assets throughout the cross-border area using "variable geometry" cross-border partnerships. The area hosts a number of good practice examples of successful instruments covering many aspects of a cross-border innovation policy mix. Variable geometry is a pragmatic approach to pursue the objectives of the TTR-ELAt, as seeking agreement across all constituent regions to implement multilaterally a fully joint policy mix co-funded by all would be too cumbersome.

The most interesting initiatives are bottom-up programmes combining funding sources on the various sides of the border; however, regional and national programmes limit cross-border participation. The Holst Centre, a joint research infrastructure co-funded by the Dutch and Flemish authorities, is one flagship initiative among a subset of cross-border regions. The TTR-ELAt has developed a strategy of supporting business development through the Top Technology Clusters (TTC) and Cross-border Cluster Stimulation (GCS) projects, involving joint funding from all constituent regions and making strategic use of European Territorial Co-operation funding through the Euregio Meuse-Rhine. A large set of experiments through joint R&D projects of a temporary nature, mostly with Interreg funding, serve to

reinforce these cross-border linkages for innovation. In addition, other co-operation takes place without public intervention. Missing in the policy mix are efforts to open existing regional and national programmes to partners from part or the whole TTR-ELAt area (mainstreaming the cross-border element). Mutual exchanges on policies occur on an *ad hoc* project basis, but not yet in a systematic way at strategic policy-making level.

Recommendations for cross-border innovation policies in the TTR-ELAt

The TTR-ELAt is one of the most advanced European experiments in building an innovation-driven functional cross-border region. The TTR-ELAt has passed the stage of experimentation and can further intensify its current efforts toward more strategic policy with associated funding. The main challenge for the cross-border area is the mismatch between its good potential for innovation-oriented growth and the weak and complex cross-border governance for capitalising on that potential.

Cross-border area: Adopt an innovation-driven definition of the cross-border area with a variable geometry for bottom-up activities

- Use the TTR-ELAt definition as the relevant cross-border area for innovation-related funding and analysis, to be recognised by supranational, national, regional and local governments.
- Maintain the variable geometry approach for programming to preserve the pragmatic and bottom-up philosophy of the TTR-ELAt.
- Collect data and communicate on cross-border facts and trends to help the constituent regions demonstrate the importance of joint action as well as measure policy impact.
- Brand the cross-border area more effectively to support an internal identity and greater external visibility.
- Continue to signal to relevant national (and in some cases regional) authorities significant cross-border integration barriers, such as regulations, transport connectivity or tax and pension issues restraining labour market mobility.

Governance: Promote a stronger co-operation platform for the TTR-ELAt with a strategic intelligence role, building on greater involvement of relevant public and non-public actors

- Maintain a coalition governance structure given the challenges of formalising governance.
- Invite regional authorities from Flanders and Wallonia (Belgium) and re-engage North Rhine-Westphalia authorities (Germany) in the TTR-ELAt cross-border efforts, for political awareness and policy support.
- Promote a stronger co-operation platform for the TTR-ELAt to support policies and to provide relevant information and analyses.
- Seek greater coherence between the Euregio Meuse-Rhine and the TTR-ELAt geographies through alignment or other means for strategic use of European Territorial Co-operation innovation-related funds, data collection and policy intelligence.

- Involve firms and knowledge actors (triple helix) to work in co-operation with public actors to support cross-border strategies and actions with bottom-up involvement.

Innovation policies and instruments: Develop a pragmatic strategy and align public funding to the strategy goals

- Refine the current cross-border strategy to better complement and engage the constituent regions and cities.

- Encourage national or regional innovation policy instruments (the level depending on the country) to "mainstream" cross-border activities for diversification and sustainability of funding sources.

- Refine the policy mix according to strategic goals and lessons from the past, building in a maximum of flexibility.

- Adapt, where possible, EU policy instruments under Territorial Co-operation, including Interreg, to support the new realities of this knowledge-based cross-border economy through more strategic rather than stand-alone projects.

- Use the border as a test bed for innovation in relevant technological sectors (i.e. energy grids, ICT solutions, etc.).

INTRODUCTION

The TTR-ELAt (Top Technology Region/Eindhoven-Leuven-Aachen Triangle) gathers six regions located at the intersection of Germany, the Netherlands and Belgium (Figure 0.1). The area in which the TTR-ELAt is located has a long history of cross-border policy efforts. Such collaboration began in the 1970s with project-based co-operation among the cross-border regions of the Euregio Meuse-Rhine (an area that covers a large part of the TTR-ELAt area) and the Euregio Rhine-Meuse-North (EMRN). These activities provided a test bed for experimenting with cross-border collaboration. The TTR-ELAt was launched in 2009 as the merger of two initiatives, the TTR and the ELAt. The TTR (Top Technology Region) was first established in 2004 in recognition of the role of the Southeast Netherlands in its national context for technology-led growth, and subsequently enlarged through collaboration with the neighbouring regions. The ELAt (Eindhoven-Leuven-Aachen Triangle) was an initiative of the mayors from the three cities that also began 2004, which was soon joined by several local and regional actors, notably universities, located in the "triangle" area. The large number of co-operation projects in the cross-border area has helped to define the combined TTR-ELAt as the most relevant cross-border functional definition for technology and innovation policy support.

Figure 0.1. **Top Technology Region/ Eindhoven-Leuven-Aachen Triangle**

Note: This map is for illustrative purposes and is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Source: TTR-ELAt (2013), "Background report to OECD study cross-border regional innovation policies", March.

CHAPTER 1

THE TOP TECHNOLOGY REGION-ELAT CROSS-BORDER AREA AS A FUNCTIONAL REGION

Table 1.1. **Snapshot of the functional region for innovation**

(TTR-ELAt in bold)

Characteristic	Specification	Comments
Region settlement patterns	Metropolitan area **Network of small and medium-sized cities** Sparsely populated with small cites/towns	The TTR-ELAt includes several medium-sized cities and their regions in a densely populated area. The Dutch and German areas are located at some distance from their capital areas.
Internal accessibility and flows (geographic proximity)	**Strong** Moderate Weak	The TTR-ELAt extends over a relatively compact territory with good rail and road connections and multiple regional airports. Some inter-connections within the area could be improved, but overall accessibility is not a major challenge.
Industrial and knowledge specialisations (cognitive proximity)	**Similar with complementarities** Same Different	The TTR-ELAt member regions share strengths in three broad fields: health and life science; high-tech systems including ICT and energy; and advanced materials and chemicals. Regional strengths also differ, giving rise to complementarities in knowledge-based activities (such as aerospace in Liège).
Socio-cultural context (social proximity)	Very similar **Somewhat similar** Different	Language barriers are low, with the exception of the French-speaking part of TTR-ELAt. Cultural differences are reported as sometimes a challenge, even if these are playing a diminishing role in business interactions.
Innovation system interactions	**Pervasive** Hub-to-hub On the border	Actors throughout the area co-operate with each other in a variable geometry, due to the multi-polar configuration of the area. Much of these interactions occur bilaterally between actors in two cities or regions within the area.
Level of innovation development across border	**Balanced, strong** Balanced, weak Unbalanced	All regions in TTR-ELAt are advanced in terms of innovation assets and performance.

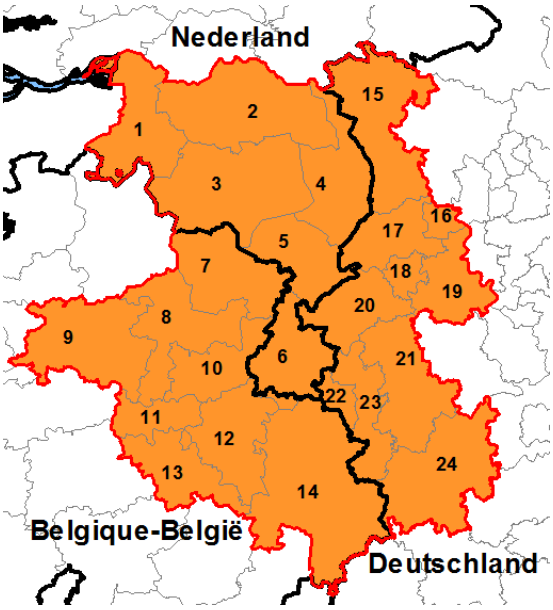
1.1. Spatial definition of the cross-border area

The Top Technology Region/Eindhoven-Leuven-Aachen triangle (TTR-ELAt) is an area that includes six regions around the borders between Germany, the Netherlands and Belgium. The formal definition of the TTR-ELAt region actively includes the following six[1] European NUTS 2 regions (for some, only parts of the region are included) from three countries (Figure 1.1):

1. Province of North Brabant (NL41) in the Netherlands (NUTS 3 1-2-3) – only mid- and eastern parts
2. Province of Limburg (NL42) in the Netherlands (NUTS 3 4-5-6)
3. Province of Limburg (BE22) in Belgium (NUTS 3 7-8-10)

4. Province of Flemish Brabant (BE24) in Belgium (NUTS 3 9) – only Leuven arrondissement
5. Province of Liège (BE34) in Belgium (NUTS 3 11-12-13-14)
6. Cologne region (DEA2) in Germany (NUTS 3 20-21-22-23-24).

Figure 1.1. **Geographic coverage of the Top Technology Region/Eindhoven-Leuven-Aachen Triangle**



Note: This map is for illustrative purposes and is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Source: TTR-ELAt (2013), "Background report to OECD study cross-border regional innovation policies", March.

Figure 1.2. **Interreg cross-border areas overlapping with the TTR-ELAt**

Euregio Meuse-Rhine

Belgium (Flanders)/Netherlands

Netherlands/Germany

Note: Eligible areas per cross-border collaboration in darker colour, associated areas in lighter colour. These maps are for illustrative purposes and are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Source: http://ec.europa.eu/regional_policy.

The TTR-ELAt is nested in a complex set of cross-border areas defined by European Territorial Co-operation Policy. The perimeter of the TTR-ELAt overlaps largely with, but differs from, that of Euregio Meuse-Rhine, as the latter excludes Leuven (Province of Flemish Brabant, Belgium), Eindhoven (Province of North Brabant, Netherlands), part of the Province of Liège and the Düsseldorf areas, but extends further into Germany. Two other cross-border areas also cover parts of the TTR-ELAt: Belgium (Flanders)-Netherlands and to a lesser extent Netherlands-Germany (Figure 1.2). All three areas are defined according to European Territorial Co-operation Policy considerations and were not designed for innovation policy interventions.

The TTR-ELAt is a relatively compact and densely populated area of 8 million inhabitants, with multiple regions and medium-sized urban centres. It consists of a network of small and medium-sized cities (Eindhoven, Leuven, Aachen, Liège, Maastricht and Hasselt) distributed over the six regions. Its total population size puts it on par with large EU regions (and many EU countries). The high density of settlement and short distances between the various parts of the cross-border area facilitate interactions. The cross-border area is located in between larger urban areas of the Randstad in the Netherlands, Brussels in Belgium and the Rhine-Ruhr area in Germany.

Table 1.2. **Size of the TTR-ELAt**

Variable	TTR-ELAt total	Limburg Province (BEL)	Leuven Arr. (BEL)	Liège Province (BEL)	Central Lower Rhine Region (DEU)	Aachen Region (DEU)	Mid and East North Brabant (NLD)	Limburg Province (NLD)
Km^2	19 640	2 422	1 163	3 862	2 680	3 525	3 779	2 209
Population (2011)	8 193 814	844 621	487 502	1 077 203	1 544 579	1 279 324	1 837 958	1 122 627
Population density (2011)	417	349	419	279	576	363	486	508

Note: The shaded column is a region that is not actively involved in the TTR-ELAt policy efforts.

Source: TTR-ELAt (2013), "Background report to OECD study cross-border regional innovation policies", March using data sources from Eurostat, November 2012.

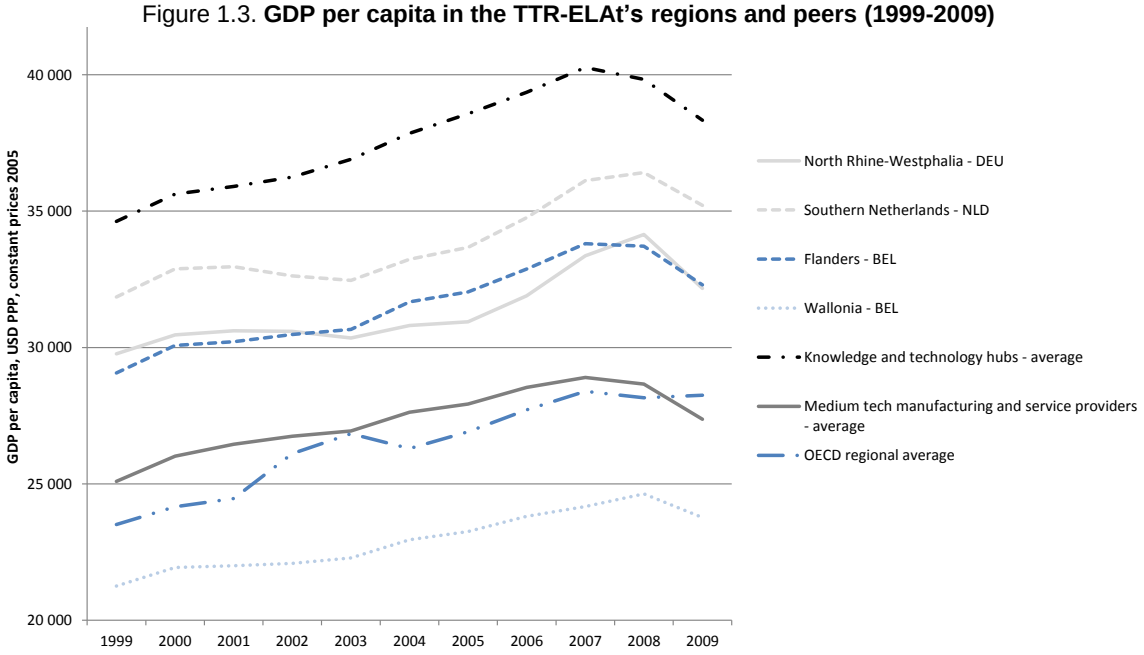
1.2. Key economic characteristics of the cross-border area

The TTR-ELAt regions have high standards of living and economic growth, yet overall economic performance stands below that of other strong technology regions. Regional wealth in the TTR-ELAt tends to conform to national trends and levels, with the exception of Wallonia, which is lagging behind in a Belgian context (Figures 1.3 and 1.5), and at a sub-regional level the Belgian Limburg Province. When compared to other global high-tech regions ("knowledge and technology hubs" in Figures 1.3 and 1.5, and a range of selected technology-driven regions in Figure 1.4), the TTR-ELAt's GDP per capita displays relatively modest values. Unemployment rates are high in many parts of the TTR-ELAt. The cross-border area is thus challenged to create more wealth from its assets.

The TTR-ELAt has a strong industrial orientation, with some areas still undergoing restructuring. The regions in the TTR-ELAt share a history of transition from traditional heavy industries (such as steel and coal) to higher value-added and knowledge-based activities. The area nevertheless maintains a strong industrial character. Approximately 22% of its workforce is employed in industry, with the area being more specialised in these activities than the European average. Belgian Limburg and Liège, and to a lesser extent Dutch Limburg and North Brabant, are the most industrial parts of the cross-border area (Table 1.3). This economic base presents many opportunities for industrial co-operation, but also

threats of delocalisation of production to regions with lower salary costs for parts of production that do not require high-skilled labour. Recent downsizing in large firms such as Philips, Nedcar, Bombardier and Ford Genk indicate that further efforts are needed to secure the competitiveness of the whole region. The Province of Liège, for example, is still facing industrial restructuring challenges, and this is visible in the high unemployment rate as well as low activity rate and GDP per capita (Table 1.3, Figure 1.5). However, large firms are maintaining production for products where skilled labour or the high degree of automation is an asset (such as high-quality medical equipment).

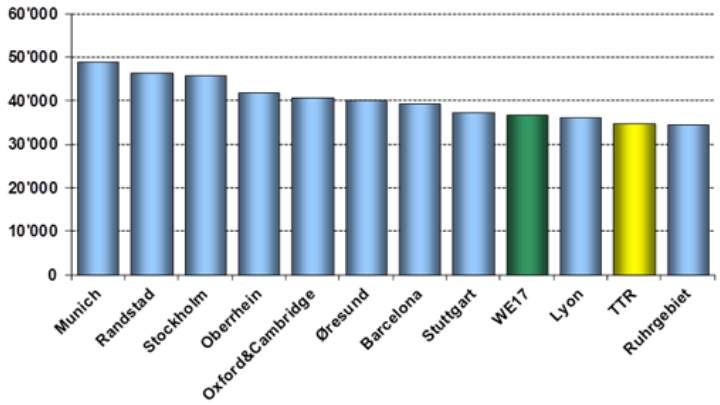
Figure 1.3. **GDP per capita in the TTR-ELAt's regions and peers (1999-2009)**



Notes: Peer regions average refers to the average of the clusters "Knowledge and technology hubs" (including Southern Netherlands) and "Medium-tech manufacturing and service providers" (all other NUTS 2 TTR-ELAt-regions). See the OECD categorisation of regions with respect to innovation-related indicators developed in Ajmone Marsan and Maguire (2011). In this paper, OECD regions with sufficient similar characteristics have been grouped together by means of a statistical methodology called "cluster analysis", on the basis of 12 socio-economic indicators related to innovation and economic performance.

Source: OECD (2013), *OECD Regional Statistics* (database), http://dx.doi.org/10.1787/region-data-en.

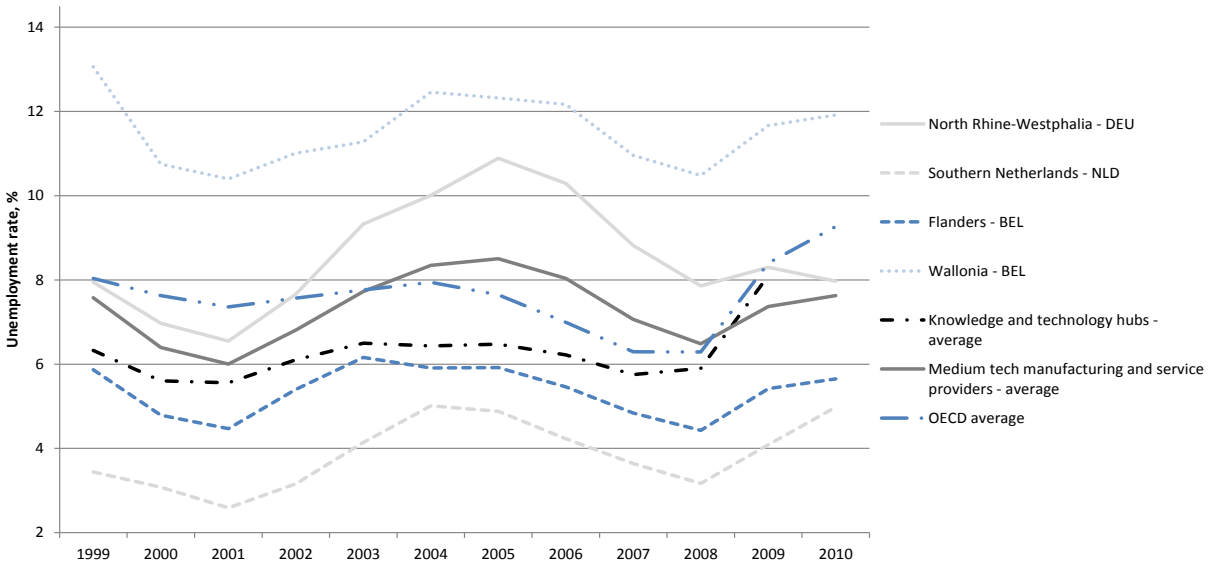
Figure 1.4. **GDP per capita in the TTR-ELAt: International comparison (2011)**



Notes: Nominal GDP per capita, in USD (PPP corrected), 2011. WE17: 17 western European countries.

Source: BAK Basel Economics (2012), as cited in TTR-ELAt (2013), "Background report to OECD study cross-border regional innovation policies", March.

Figure 1.5. **Unemployment rates in the TTR-ELAt regions and peers**



Notes: Peer regions average refers to the average of the clusters "Knowledge and technology hubs" and "Medium-tech manufacturing and service providers" (Ajmone Marsan and Maguire, 2011). Regional definitions used here exceed the coverage of the TTR-ELAt.

Source: OECD (2013), *OECD Regional Statistics* (database), http://dx.doi.org/10.1787/region-data-en.

Table 1.3. **Key economic indicators for the TTR-ELAt and its regions**

	TTR-ELAt-NUTS 2	Limburg Province (BEL)	Flemish Brabant Province (includes Leuven) (BEL)	Liège Province (BEL)	Cologne region, (includes Aachen) (DEU)	Düsseldorf region (includes Central Lower Rhine) (DEU)	North Brabant Province (NLD)	Limburg Province (NLD)
GDP (millions EUR)	340 501	22 417	35 938	25 373	133 236	179 340	87 671	35 866
GDP per capita	31 163	26 734	33 371	23 764	30 376	n.a.	36 011	31 949
Long-term unemployment (%)	2.3	1.5	1.7	5.6	3.1	3.4	0.7	1.3
Economic activity rate aged 25-64 (%)	n.a.	73.9	79.5	72.2	79.4	79.0	81.1	77.8
Share of population commuting internationally (%)	n.a.	0.056	0.008	0.037	0.005	0.008	0.003	0.018
Total exports (millions EUR)	162 006	15 345	25 091	11 397	34 773	44 694	53 364	22 036
Export (% of GDP)	0.48	0.68	0.70	0.45	0.26	n.a.	0.61	0.62
Employment % industrial (2009)	21.9	31.7	16.5	26.9	16.5	10.8	19.3	20.2
GDP growth (2004-08) (%)	n.a.	4.8	5.6	5.0	2.7	n.a.	4.7	4.3
EU Structural Funds, allocations per million inhabitants	n.a.	150	117	277	149	n.a.	119	135

Notes: Regional definitions used here often cover larger sub-regions than are actually covered by the TTR-ELAt. The shaded column is a region that is not actively involved in the TTR-ELAt policy efforts.

Source: TTR-ELAt (2013), "Background report to OECD study cross-border regional innovation policies", March using data from Eurostat and UNU-MERIT.

1.3. Innovation potential of the cross-border area

The TTR-ELAt regions have values for innovation-related variables similar to those of global leaders. According to the European Innovation Scoreboard, Flanders, North Rhine-Westphalia and North Brabant are in the "innovation leaders" category of regions, while the Dutch Province of Limburg and Wallonia (Belgium) are in the "innovation follower" category (European Commission, 2012). Under the OECD classification, Southern Netherlands is included in the "knowledge and technology hubs" and the Belgian and German parts in "Medium-tech and service providers". The BAK Basel Technological Competitiveness Index[2] for the TTR-ELAt is above the mean for 17 western European countries (BAK Basel Economics, 2012). The TTR-ELAt scores on the most widely used innovation indicators are high to very high (Table 1.4). Most of the TTR-ELAt sub-regions, especially among the participating Belgian areas, share the important asset of a large share of the workforce with a tertiary education, well above the OECD average.

Table 1.4. **Innovation overview of the cross-border area**

Variable	North Rhine-Westphalia (DEU)	South Netherlands (NLD)	Flanders (BEL)	Wallonia (BEL)	OECD peer average Knowledge and technology hubs	OECD peer average Medium-tech manufacturing and service providers
Tertiary educational attainment (% of labour force) (2008)	22.4	28.9	36.4	34.1	30.8	28.1
R&D personnel (% of total employment) (2009)	1.6	1.4	1.9	1.6	2.7	2.1
Share of employment in high-tech manufacturing (2008) (%)	40.5	35.2	38.3	37.0	49.2	39.8
Share of employment in knowledge-intensive services (2008) (%)	52.3	50.9	52.9	51.1	56.7	48.9
Total R&D expenditure as a % of GDP (2009)	2.05	2.22	2.12	2.22	3.93	1.78
Business R&D expenditure as a % of GDP (2009)	1.24	1.68	1.39	1.68	2.91	1.05
Share of R&D by private sector (%)	60	75	65	75	74	59
PCT patents per million inhabitants (2008-10 average)	502	1 470	355	235	780	236

Notes: Regional definitions used here often cover larger sub-regions than are actually covered by the TTR-ELAt. Peer region definitions for EU regions only for R&D personnel and R&D expenditure-related variables. Peer groups defined in (Ajmone Marsan and Maguire, 2011).

Source: Eurostat and OECD (2013), *OECD Regional Statistics* (database), http://dx.doi.org/10.1787/region-data-en.

Modest specialisation in high-tech manufacturing may reflect the loss of certain production activities and a shift towards knowledge-based services. Apart from the German side, the TTR-ELAt's regions do not appear strongly specialised in high-tech manufacturing activities. This may be due to the loss of job-rich productive activities in such sectors (such as those parts of the value chain covering assembly functions) and an ongoing need to transition to higher technology industries. Knowledge-intensive services are well represented in the area, and this can partly be explained by a shift towards more conceptual activities like R&D and design.

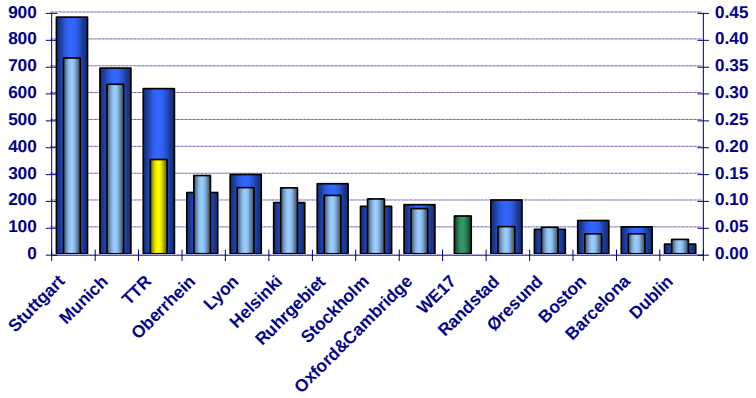
R&D investment and personnel are high, but not on par with the top hubs. R&D investments and the share of personnel employed in R&D are both strong compared to the EU average, but lower than that of OECD "knowledge and technology hubs". The TTR-ELAt therefore requires additional R&D investment efforts to meet the levels of global technology hubs. The difference in relative strengths of

private versus public R&D efforts gives rise to complementarities through exploiting science-industry relationships across borders.

The TTR-ELAt stands out in particular with respect to its high patenting activity, concentrated in Eindhoven. The high patenting propensity in the TTR-ELAt as a whole (Figure 1.6) is essentially due to the high scores on the Dutch side, and in particular, the Eindhoven area which is home to Philips and the open innovation campus. While most parts of the TTR-ELAt patent more than the average "medium-tech manufacturing and service providers", only the Eindhoven region can compare to the patenting rate of the "knowledge and technology hubs" (Table 1.4).

Figure 1.6. **TTR-ELAt patenting in international comparison**

Patents (absolute value-left, outer bar) and patents per employee (right, inner bar), 2002-04



Note: WE17: 17 western European countries.

Source: BAK Basel Economics (2012) as cited in TTR-ELAt (2013), "Background report to OECD study cross-border regional innovation policies", March.

Centres of strong R&D and technology activities are distributed throughout the TTR-ELAt, forming a dense network of knowledge-intensive resources in close proximity. The various nodes in the TTR-ELAt where public and private R&D and technology development activities thrive are the main cities from the constituent sub-regions of the cross-border area. They include: Aachen, Eindhoven, Maastricht, Leuven, Hasselt and Liège. Assets of these various sub-regions differ, but all show potential to contribute to the overall R&D and technology strengths of the TTR-ELAt (Box 1.1).

Box 1.1. **Facts on the technology-intensive character of the TTR-ELAt**

- The Aachen region is home to 10% of Germany's scientists but only 1% of the national population. The RWTH is Germany's top-ranked university in the engineering disciplines. The RWTH's total budget is EUR 748 million. At EUR 314 million, the RWTH Aachen University is one of the leading German universities in terms of attracting third-party funding.
- Half of all Dutch patents originate from the High Tech Campus Eindhoven – a reflection of the key role of Philips. Eindhoven is the home of two Knowledge Innovation Communities (KICs) of the European Institute of Innovation and Technology: KIC InnoEnergy and KIC ICT.
- Leuven University (Flanders, Belgium) is amongst the 20 leading universities in the EU, employs 6 679 researchers and will spend about EUR 365 million on research in 2012/13.
- Chemelot Campus in Sittard-Geleen (the Netherlands) is one of the largest chemical sites in Europe and houses more than 60 companies, of which many are involved in R&D activities.
- Growth in R&D expenditure per capita (2004-08) was 7.2% in the Province of Liège (Wallonia, Belgium).

Source: TTR-ELAt (2013), "Background report to OECD study cross-border regional innovation policies", March.

The cross-border area hosts a large number of public and private innovation actors. The TTR-ELAt contains 7 universities with more than 150 000 students as well as many other higher education institutions (HEIs). A range of multinationals as well as domestic firms heavily investing in R&D and engaged in innovation activities are located in the area. A host of transfer and innovation support organisations and innovation networks are also present (Table 1.5). There are many well-developed high-tech SMEs and start-ups that are active around the different technology hubs in the cross-border area. Several R&D-intensive companies are foreign-owned, with decision centres often located outside of the region. The cross-border area is thus tasked with ensuring an attractive environment as one way to maintain these high-tech actors in the region.

Table 1.5. **Key innovation actors in TTR-ELAt**

Actors	Belgium	Netherlands	Germany
Universities, HEIs and public research organisations	Leuven: KUL, IMEC, VIB (the Flemish Institute for Biotechnology), iMinds Limburg: Hasselt University, Limburg University College, Limburg Provincial University College PHL), and XIOS University of Applied Sciences merged into: "PXL University College", VITO Liège: University of Liège, Interface –ULG, CHU and CHR Liège, research centres: SIRRIS, Centexbel, Cebedeau, CEWAC, CRM group, CSL, Centre Spatial de Liège	Eindhoven: Eindhoven University of Technology, Tilburg University, Design Academy Eindhoven, Fontys University of Applied Sciences, TNO, Holst Centre and the Embedded Systems Institute (ESI), Dutch Polymer Institute (DPI), TÜV Rheinland TNO Automotive International, ECN, the Energy Research Centre of the Netherlands Limburg: UM (Maastricht University), Horst agro institute, Zuyd Hogeschool, MSM (Maasricht School of Management), Fontys University of Applied Sciences, NUTRIM, OU (Open University) Academic Hospital Maastricht	Aachen: RWTH Aachen University, FH Aachen University for Applied Sciences, Research Center Jülich, Fraunhofer-Gesellschaft, University Hospital Aachen (UKA)

Table 1.5. **Key innovation actors in the TTR-ELAt** (*cont.*)

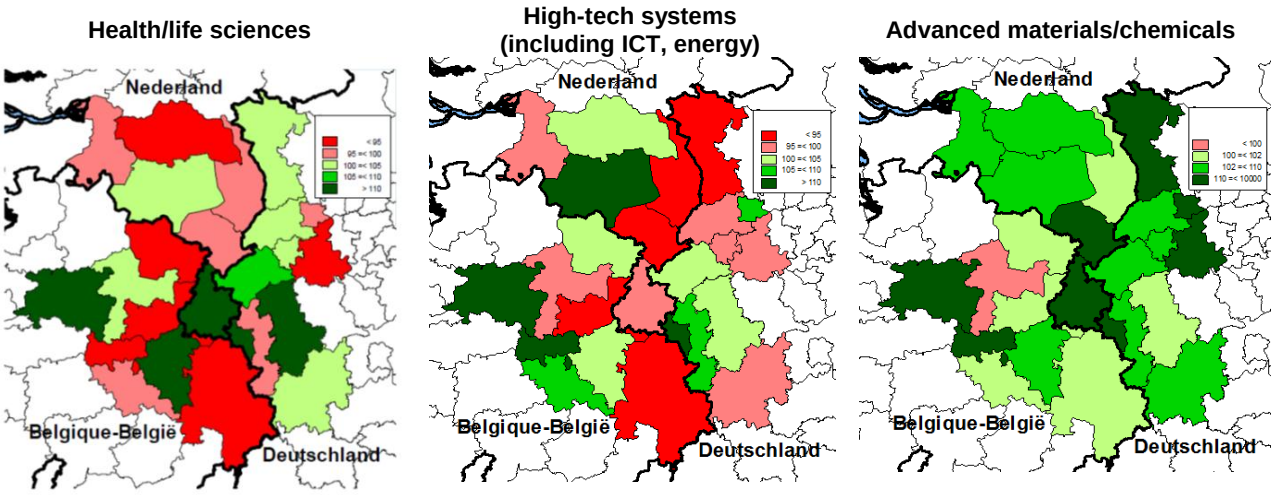
Actors	Belgium	Netherlands	Germany
R&D-intensive and innovative companies (sample)	Leuven: Inbev, Danone (food); Huntsman (chemicals); Terumo (medical) Limburg: Ford[1] (auto), Tessenderlo (chemicals) Arcelor+Stainless (steel) Liège: Prayon (chemicals), Tecteo (network management); Techspace aero (aeronautics), Cableries d'Eupen (connections)), EVS Broadcast, Arcelor-Mittal	Eindhoven: Philips (electronics), ASML and Atos (ICT), DAF (transport), NXP semiconductors, Stork (machinery) VDL (Industrial suppliers), Sioux Group (embebbed systems), Vanderlande Industries, Intervet, MSD, TomTom, CCM, OTB Group, FEI Limburg: Medtronic, Flextronic, Pie Medical, Nunhems, Doc Morris (life science), DSM, SABIC, Trespa International and OCI (chemicals), VDL-Nedcar (auto), Canon-Océ (ICT), Boels (logistics), Maastricht Instruments, Lanxess, Isobionics	Aachen: Private R&D labs of Ford, Philips, FEV, Denso, Ericsson, Microsoft, Siemens Grünenthal and Metsä Tissue. Aixtron, Cerobear, CSB, Ericsson Eurolab Deutschland, GIF, Neapco Europe, Procter & Gamble, and Toho Tenax
Technology transfer, intermediaries and networks	Leuven: KU Leuven Research & Development (LRD) is the technology transfer office of KU Leuven, Flanders Smart Hub, Leuven.INC, DSP Valley, Innovation and Incubation Centre, Bio-incubator Leuven, Arenberg science park, Haasrode science park, Feed Food Health Limburg: Diepenbeek campus, Innovatiecentrum Limburg, Flanders' Drive, Vlaams Instituut voor Mobiliteit, EnergyVille, BioVille life-sciences incubator, GreenVille cleantech incubator, research Campus Hasselt, PC Fruit, research centre focused on fruit, C-Mine Genk creative economy incubator, Microsoft Innovation Centre-Genk, Hasselt University TechTransfer Office Liège: Liège Science Park, University of Liège TTO, GIGA, Wallonia Space Logistics, Liège Biomed, BioWin, MecaTech, SPI, ID Campus	Eindhoven: Brainport, BOM, High Tech Campus Eindhoven AutomotiveCampusNL, solar research alliance, Solliance Limburg: LIOF, Syntens, Maastricht Health Campus, Chemelot Campus, Greenport Venlo	Aachen: AGIT, RWTH Campus Aachen, REGINA in ICT, LifeTecAachen-Jülich in life sciences, INTRA in plastics and Competence Center Automotive Region Aachen, Aachener Kompetenzzentrum Medizintechnik (AKM), Avantis Science and Business Park

Note: 1. However, Ford has been withdrawing its investment from the Genk site.

Source: TTR-ELAt (2013), "Background report to OECD study cross-border regional innovation policies", March.

A core asset for the TTR-ELAt as an innovation-oriented functional region is the complementarity in specialisations in high-technology activities in all sub-regions. Empirical studies have highlighted the particular strengths of the cross-border region in three high-tech areas, namely: 1) chemicals and advanced materials; 2) high-tech systems; and 3) health sciences. The strength in high-tech systems is more concentrated, especially in Eindhoven and Leuven. The strengths in chemicals and advanced materials are found more generally across the TTR-ELAt area. The health sciences sector appears to be strongest in the southern part of the cross-border area. Some of these sectors grew faster in the TTR-ELAt than in Western Europe as a whole between 2008 and 2012 (TTR-ELAt, 2013). There are variations in the strength of public and private actors in the different areas of specialisation among the sub-regions (Figure 1.7). The fact that all of the sub-regions hold assets in several of those fields generates a balanced potential for innovation.

Figure 1.7. **TTR-ELAt Technological Competitiveness Index in three high-tech sectors**



Notes: The Technological Competitiveness Index is the average of four indicators: share in value-added in technology sectors; value-added growth; patents; scientific publications. Western Europe (15 old EU members countries, Norway and Switzerland) = 100. Red/Green: below/above Western Europe average. These maps are for illustrative purposes and are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Source: BAKBASEL, IBD (2012).

Technological diversity is characteristic of the region, giving opportunities for variable geometry in co-operation. Some of these identified specialisations include: high-tech systems in Eindhoven, ICT and nanotechnology in Leuven, aerospace research in Liège, cardiovascular research in Maastricht, energy and mechanical engineering in Aachen and language science in Hasselt. Variable geometry in innovation collaborations is characteristic of the area, as not all sub-regions co-operate in all of the TTR-ELAt's fields. This combination of expertise also gives rise to opportunities at the intersection of these domains thanks to the pervasive use of ICT and other generic technologies.

Networks and other strong public-private-HEI co-operations (triple helix) are present in the TTR-ELAt. Beyond the strengths of individual actors, firm-to-firm, inter-HEI and industry-science co-operation further fuel the TTR-ELAt's innovation potential. There is no accurate measurement of the density of such co-operation, but available evidence points towards this conclusion. High scores of the universities in terms of income from industry are found for Maastricht University, KU Leuven, TU Eindhoven and RWTH Aachen University. There are intense spin-off dynamics and co-location on campuses throughout the area. There are notable value-chain linkages among the TTR-ELAt's regions, as well as clusters present in each region (Table 1.6).

Table 1.6. **Selected clusters and technology specialisations in the TTR-ELAt**

Aachen region (DEU)	Life science, ICT, advanced materials, energy, automotive, mechanical engineering
Flemish Brabant province (BEL)	Nanotechnology and ICT, lifetech, cleantech, logistics, createch
Limburg province (BEL)	Life sciences, smart grids/green energy, cleantech, creative economy
Liège province (BEL)	Biotechnologies, space technologies, high-tech systems, ICT, logistics, environment and sustainable development, agro-food, mechanical engineering
North Brabant province (NLD)	High-tech systems and materials, food and technology, automotive, life tech and health, design
Limburg province (NLD)	Life sciences, bio-based and biomedical materials, chemicals and advanced materials, agro-food horticulture, logistics

Source: TTR-ELAt (2013), "Background report to OECD study cross-border regional innovation policies", March.

1.4. Functionality of the cross-border area

The TTR-ELAt cross-border area has many assets to thrive as a strong hub in the global knowledge-based economy. The TTR-ELAt is a dense cross-border area of over 8 million inhabitants, including multiple city and regional growth poles. Most of its member regions have completed their successful transition from declining traditional industries, such as coal mining and steel industries, towards higher value-added and knowledge-based industries and services. Today, several of these regions are among the "innovation leaders" group of regions within Europe. The TTR-ELAt hosts a highly educated workforce and many innovative firms, universities and research institutions, some of which are niche players of international excellence. Philips in Eindhoven, other large R&D-intensive multinationals like DSM, and the IMEC research centre in Leuven are among the leading actors in supporting the high-tech orientation and open innovation practices in the TTR-ELAt area. Industrial campuses and science parks promote interaction among firms, research centres and universities, and the public sector ("triple helix" activity) serving as strong nodes throughout the area for innovation-driven growth. For instance, the University of Liège and Interface act as a Multipolar hub in innovation. With this density of actors located within a radius of 100 kilometres, travel for face-to-face meetings can take place within a day, supporting functionality from an innovation perspective.

The density of cross-border firm, labour market and knowledge flows may be significant, but is difficult to assess given the absence of data. Despite a long history of collaboration, there is a general lack of basic information on cross-border flows. Thus far, the TTR-ELAt has focused on external benchmarking with respect to areas of industrial and technological expertise. Some other cross-border areas have developed a greater level of cross-border statistics on a wider range of domains as well as more in-depth analyses to inform policy, such as in the Oresund (Denmark-Sweden) and in Ireland/Northern Ireland (United Kingdom) (Box 1.2). In the Oresund, for example, a multi-faceted index tracks the degree of integration on several parameters, and in the future may be expanded for innovation-specific variables. Perhaps upcoming efforts of the Euregio Meuse-Rhine or other entities that may address cross-border data could benefit from these examples.

Box 1.2. **Cross-border data portals and analyses: Oresund and Ireland-Northern Ireland (United Kingdom)**

Cross-border data portals

AIRO (All-Island Research Observatory) is an online portal collecting statistics and undertaking analysis on an all-island basis for Ireland and Northern Ireland, United Kingdom. The main goal of the portal is to gather data, produce analysis and provide evidence and tools to support policy intelligence and decision making on the island of Ireland. AIRO develops indicators and statistics, mapping and visualisation tools available to online users, policy advice, training and research. AIRO is active on a broad set of themes, from demographics to economics, education, transport, regional and local development, and communications and technology. AIRO works on a number of cutting-edge research topics related to spatial analysis, such as the definition of functional territories, exploiting complementarities between urban centres and rural areas, and mapping social inclusion over space. AIRO was born as a cross-border initiative sponsored through Interreg IIIA, by the National University of Ireland, Maynooth, Queens University, Belfast and Dundalk Institute of Technology, in Northern Ireland (United Kingdom). AIRO provides indicators and analytical support to different levels of jurisdictions: local authorities, regional institutions and organisations at both the national level and the European level.

Orestat contains comparable statistics for the Oresund region (Denmark-Sweden) in several areas, such as demography, housing and employment. The database was built through two Interreg projects, Orestat I and II. During the project period of Orestat III, the technical platform will be upgraded. Orestat will conduct six exploratory studies to develop comparable statistics on the different priorities of the regional development strategy for Oresund (ORUS). The exploratory studies will be preceded by workshops with a wide range of users and experts. The database will contain comparable statistics in various areas such as employment, education, environment, health, culture, infrastructure, industry structure, the regional economy, and research and innovation.

Cross-border institutions conducting analyses

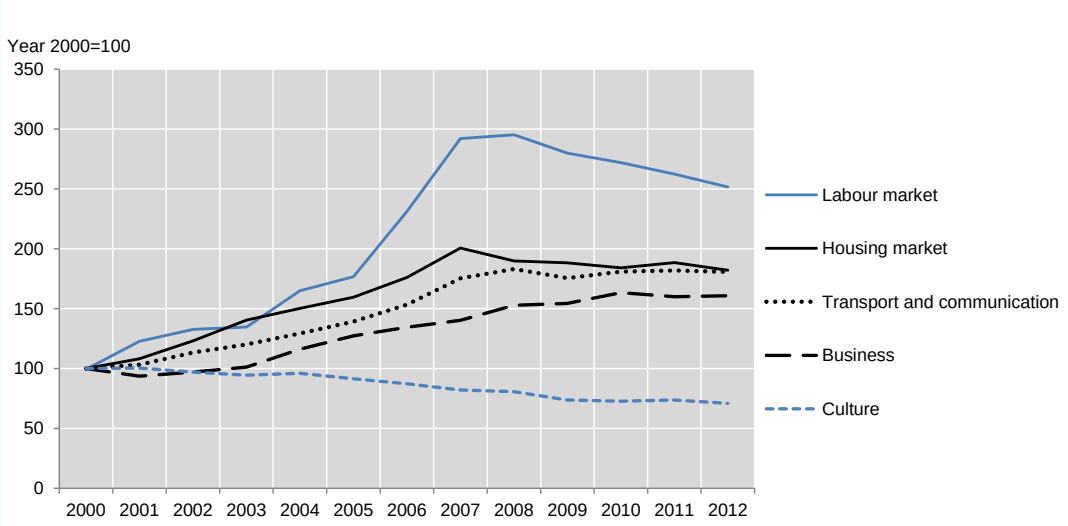
InterTradeIreland conducts regular business surveys with respect to cross-border issues. The bi-national business support agency (Ireland – Northern Ireland, United Kingdom) provides programmes and conducts research as part of its policy intelligence work. For example, a recent survey highlighted a positive relationship between innovation and export orientation, where firms which export off the island display a higher level of innovation activity compared to non-exporters. This positive influence is evident, but to a lesser degree, for cross-border traders, which could signify benefits to businesses of accessing diverse knowledge inputs at the cross-border level. Larger firms (55%) are more likely to be partnering for innovation than smaller firms (36%), while the same holds for exporters (58%) and cross-border traders (53%) compared to domestic firms (31%). One fifth (19%) of innovators work with cross-border innovation partners. These relationships are focused heavily on clients/customers and suppliers, with collaboration generally much less widespread for other partners. A quarter (24%) of innovators has international partners. Overall, international partnerships are more widely reported than cross-border relationships for links with suppliers, higher education institutes, intermediaries and business services.

The **Oresund Institute** conducts research on different political economy issues related to the Oresund (Sweden-Denmark) cross-border area. The non-profit Danish-Swedish association was founded to encourage integration within the Oresund region, between Greater Copenhagen/Zealand in Denmark and Malmö/Scania (Skåne) in Sweden. The Oresund Institute's primary objective is to help realise the enormous potential of integration. It provides facts and unbiased research to stimulate debate and promote the international positioning of the Oresund Region. Products include a quarterly magazine, *JOBØMAG*, as well as numerous research reports and events. The institute works with the region's 14 universities to create and disseminate analysis and ideas supporting the region's development and its integration process.

The **Oresund Index is produced by the Oresund Committee**. It was recently reinstated after having been initially launched years ago by business associations. The index has five sub-indices covering issues of the labour market, transport and communications, housing market, business and culture. In the future it may cover more specific innovation elements. It has provided a useful overall understanding of the local dynamics, and the changes since the crisis hit in 2008. It has also served as a useful indicator for policy purposes and for drawing media attention to the different indicators of integration in the cross-border area.

Box 1.2. **Cross-border data portals and analyses: Oresund and Ireland-Northern Ireland (U.K.)** (*cont.*)

Oresund Integration Index: 2000-12



Source: www.airo.ie; www.interreg-oks.eu; extracts from InterTradeIreland Business Surveys reports based on the InterTradeIreland Business Survey 2011; Oresund Committee.

Box 1.3. **Cross-border science and industrial park: Chemelot (chemicals)**

Chemelot is a cross-border industrial park developed in co-operation with Maastricht University and other institutes for higher education, including the German RWTH Aachen University. There are more than 100 companies on the site. Many of these firms are global leaders in their product market and currently employ 6 000 people. The Chemelot Innovation and Learning Laboratories (CHILL) offer an "open laboratory" where students as well as start-up firms have opportunities to do research and link up with other companies at the campus.

Maastricht University and the RWTH Aachen have together established a new institute in bio-based materials (AMIBM). Maastricht University and Eindhoven University of Technology, together with DSM, are currently considering the establishment of the Chemelot Institute for Science and Technology, which will focus research on bio-based and biomedical materials.

The goal of the campus is accelerated business growth through a unique chemistry and materials community. The target is to grow to 1 000 FTE in R&D and R&D support activities, in addition to the 1 100 in 2012, and to grow to 500 students (intermediate and higher vocational level as well as university level). To accomplish this, the triple helix partners have committed themselves to a joint investment of EUR 35 million in business development over 10 years. In addition, there will be EUR 155 million invested in research infrastructure, and to support this growth, venture capital of EUR 50 million has been raised.

Source: TTR-ELAt (2013), "Background report to OECD study cross-border regional innovation policies", March; OECD (2012), "Local scenarios of demographic change: Policies and strategies for sustainable development, skills and employment: Summary of Limburg seminar", OECD, Paris.

Available evidence indicates that many interactions take place spontaneously, or thanks to dedicated initiatives and funding aiming at fostering such links (e.g. Chemelot Campus, Box 1.3). Survey evidence from South Netherlands also indicates that proximity matters for interactions in technology and innovation, especially for companies, and that most exchanges from this region take place with the neighbouring regions of Flanders and North Rhine-Westphalia. Some actors are already internationalised, such as Maastricht University, which is one of the most international universities in Europe (see Box 4.3). It is bilingual (Dutch and English) with almost half of the student population and one third of the academic staff being non-Dutch (mainly from Germany and Belgium). Firms are also seeking to increase their cross-border linkages, such as through the BiELAt Foundation (Box 1.4).

There are several barriers for the TTR-ELAt to capture its full potential as a functional cross-border area. Competing definitions for the area (TTR-ELAt, Euregio Meuse-Rhine) and weak branding limit internal and external recognition of it as a functional cross-border area, particularly to attract and retain talent. Despite the long history of cross-border collaboration, language and cultural differences hamper cross-border flows, including a limited awareness of the assets and actors present on the other side of the border. Differences in national regulations and tax systems impede labour mobility. Improvements in certain public transport links would also strengthen the cross-border labour market. The presence of initiatives such as the EURES (providing cross-border labour information for workers), expatriate centres or the Knowledge Centre for International Staff at the University of Maastricht, alleviate some of these barriers to a certain extent. Also, like in all cross-border areas, differences in legislation and regulations limit certain economic relationships and innovation collaborations across the borders.

Box 1.4. **The BiELAt Foundation: Connecting entrepreneurs in three countries**

The BiELAt Foundation was created in 2005 by a group of entrepreneurs from the Eindhoven region who sought to facilitate and promote business opportunities in the cross-border area where they are located. BiELAt activities started with an event gathering academics and business leaders, who decided to put creativity, entrepreneurship and innovation at the top of the foundation's agenda. The primary goal of BiELAt is to facilitate the creation of business connections, knowledge sharing and opportunities among the business community, research institutions and investors across Southern Netherlands, North Rhine-Westphalia and Belgium. The business community is aware of the rich innovation eco-system in the area, but it recognises the difficulties in mapping and meeting relevant private actors operating across the border.

The two-person secretariat of BiELAt works in the Netherlands and in Belgium to organise matching and networking events for entrepreneurs in the area. On average, BiELAt organises four to five events per year, where entrepreneurs meet with external experts, investors and the research community to create business opportunities. BiELAt is mostly funded through participation fees of companies, since often the administrative burden and compliance rules in the different public administrations are too complex for efficient and effective event organisation. BiELAt events are organised in different locations in order to maximise the participation of entrepreneurs from different areas.

Source: TTR-ELAt (2013), "Background report to OECD study cross-border regional innovation policies", March; www.bielat.nl and interview with the OECD.

CHAPTER 2

DRIVING FORCE AND KEY ACTORS FOR THE TOP TECHNOLOGY REGION-ELAT CROSS-BORDER AREA

2.1. Rationale for the establishment of the cross-border area

Table 2.1. **Snapshot of the rationale and its relevance for cross-border collaboration**

(TTR-ELAt in bold)

Driver	Explanation	Relevance for cross-border co-operation
Economies of scale	Combine resources for efficiency of investment, larger labour markets or access to wider business and knowledge networks to increase critical mass	**Strong** Moderate Weak Not present
Political influence	Develop greater political power for more financial resources and better dialogue with higher levels of government	Strong **Moderate** Weak Not present
Complementarities	Build on diversity of assets in terms of research, technology and economic base, as well as supply chain linkages	**Strong** Moderate Weak Not present
Branding	Increase internal recognition of the cross-border area as well as its external attractiveness to firms and skilled labour	**Strong** Moderate Weak Not present
Border issues	Address the day-to-day opportunities and challenges associated with flows of people, goods and services (including public services) across the border	Strong Moderate **Weak** Not present

Note: The assessment of relevance relates to the actual relevance in current cross-border collaboration, not necessarily to the potential relevance.

While there is a long history of cross-border collaboration for different rationales, achieving economies of scale is an important motivation for TTR-ELAt collaboration. The TTR-ELAt has an explicit goal of joining forces across borders to achieve greater critical mass with a view to better attract and retain firms and high-skilled workers in the area. Its good internal and external accessibility, and the direct access to large markets in close proximity, bring the benefits of agglomeration economies to this network of regions and cities in an area that lacks a strong metropolitan hub. Despite relative geographic and technology proximity among constituent regions, there are still challenges for identifying relevant innovation partners on the other side of a border. Several attempts at networking are reported to have not necessarily resulted in joint activities among cross-border actors.

Building on asset complementarities is increasingly becoming a main rationale for an innovation-driven TTR-ELAt. This rationale is more recent and the most promising driving force for TTR-ELAt collaboration. The region has considerable potential to find and exploit new combinations of complementary knowledge, expertise, skills, infrastructure and funding sources in order to develop new products and services. There are several sectors in common across different sub-regions within the cross-border area, but also some interesting differences. Technologies at the intersection of several fields, such as health or energy with high-tech systems, for example, are actively pursued in the region. The

region can therefore benefit from what has been termed “related variety” or “proximate diversity” to reinforce innovation in the cross-border region.

Achieving greater political recognition from national (and in some cases regional) authorities is also a driver of TTR-ELAt action, but to a lesser extent. The two provinces of Southeast Netherlands are not part of the Randstad, the locus of economic and political power in the country. The Dutch part of the TTR-ELAt has therefore sought to increase its visibility with respect to national authorities by forming a stronger and larger area with its neighbouring regions and highlighting the importance of cross-border linkages for their growth. This rationale also plays a role for Aachen, which is a relatively small part at the border of the *Land* of North Rhine-Westphalia, a region with a population exceeding that of the Netherlands as a whole. Political recognition is not as important a motivation on the Belgian side, since the participating areas are important in their respective regions, Flanders and Wallonia.

Branding the cross-border region as an integrated labour market and innovation space is increasingly important to reach the TTR-ELAt’s fundamental goals. There is a strong rationale for the cross-border region to improve both its internal and external visibility. The lack of metropolitan hub is a barrier for creating visibility and attracting creative talent, even if the Flemish Brabant sub-region does not face this challenge due to its proximity to Brussels. Internally, further efforts are needed to raise the awareness among public and private actors about assets and potential partners, programmes and other opportunities in all parts of the cross-border area. In terms of external visibility, while prominent multinational firms help to create a global image for the area, challenges for attracting and retaining skilled workers remain. There is no identity associated with this area. Naming issues for the cross-border co-operation (which indeed takes a square or multipolar shape rather than that of a triangle) are complex and politically sensitive. Other cross-border regions, such as the Oresund, have a range of cross-border cultural activities and informational magazines to support internal regional identity as well as cross-border cluster marketing to gain international visibility (such as the Medicon Valley Alliance).

Historically, such as for the founding of the Euregio Meuse-Rhine decades ago, solving border problems was the main collaboration rationale. Facilitating flows of citizens, goods and services (including public services) has been at the heart of many cross-border collaborations internationally. This motivation still plays a role in the context of the TTR-ELAt; however, the focus on such issues is diminishing with an increased focus on technology and innovation support. Nevertheless, reducing border problems can only facilitate the innovation-focused efforts of the TTR-ELAt. For example, practical border issues related to employment laws and policies in different countries, as well as certain public transport connections, remain an impediment to a common labour market.

2.2. Role of key actors in the cross-border area establishment and evolution

Both public and private actors have contributed to making the cross-border area a reality, in its various definitions. In the private sector, some firms such as Philips have multiple locations on different sides of the border, serving as a forerunner to public co-operation. Multinational companies, like DSM and SABIC, practice open innovation and search for complementary assets, but are less mobilised on the “peripherality” or “border issues” as motivations for collaboration, considerations that resonate more with public actors. Universities and public research centres have identified relevant opportunities for collaboration based on excellence in research that are often co-located in the same cross-border area. Among the public actors, some of the constituent TTR-ELAt regions are more focused on innovation collaboration and others on border challenges. SMEs, in particular, are the most difficult actors to mobilise across borders, unless very concrete business benefits can be identified.

2.3. Barriers for cross-border co-operation linked to actors

A first barrier to cross-border co-operation is the lack of information on the potential, capacities and activities on either side of the border, particularly among firms. Some firms are well-positioned to take advantage of the different assets throughout the cross-border area. Multinational corporations like Ford or Philips have establishments in several parts of the TTR-ELAt to take advantage of these assets. Many area universities are already working in an international environment. SMEs face the most difficulties in accessing information beyond their country's border.

Public funding for innovation stops at the border, limiting certain cross-border collaboration. For those innovation-driven and sometimes riskier cross-border partnerships, it is difficult for firms to obtain public funding. The TTC/GCS projects through Interreg are the first that allow cross-border funding to firms. Sometimes public funding requirements are stricter than national boundaries and may restrain collaboration from one region to the next in the same country.

Differences in culture and business practices across borders are reportedly still a barrier. Despite the proximity and openness of economic actors to operate in adjacent regions, mentality and business practices differ. Those differences tend to be less significant for high-tech partnerships that source globally or involve foreign people and mobility of staff.

CHAPTER 3

GOVERNANCE OF THE TOP TECHNOLOGY REGION-ELAT CROSS-BORDER AREA

Table 3.1. **Snapshot of governance characteristics**

(TTR-ELAt in bold)

Characteristic	Specification	Comments
National political capitals	Yes, each side Yes, at least one **None**	The region is multipolar and includes secondary cities in their national/regional context.
Longevity of public co-operation (social proximity)	**>20 years** 10-20 years <10 years	The Euregio Meuse-Rhine (EMR) was founded in the 1970s. The TTR-ELAt builds on this long history of cross-border co-operation in the area, with the TTR and the ELAt each beginning in 2004 and joining forces in 2009.
Innovation policy competencies (institutional proximity)	Balanced, strong Balanced, weak **Unbalanced**	Dutch provinces have few legal competences but are very active in innovation policy; Belgian regions have full competence in this matter (but not the Belgian provinces) and the same holds for German *Länder*.
Political commitment (institutional proximity)	Balanced, strong Balanced, weak **Unbalanced**	Commitment towards this cross-border innovation co-operation is the strongest at Dutch national and provincial level. Other regions remain engaged but to a lesser extent, although North Rhine-Westphalia could be re-engaged in the collaboration. The political commitment of the Province of Liège to the TTR-ELAt needs to be clarified, as well as that of the 7th region (Düsseldorf area) that is not yet active.
Institutionalisation and legitimacy (institutional and social proximity)	Present, strong Present, weak **Not present**	There is no institutionalisation of the TTR-ELAt, and the partial but not total mapping with the EMR represents a missed opportunity to reinforce cross-border area growth.
Actors in governance	**Public sector** University/research actors Firms **Mix of actors (triple helix)**	The formal governance structures are entirely public sector driven. However, increasingly collaboration in policy making and projects takes on a more triple helix form, including multinationals and other firms, research centres, universities and intermediaries.
Funding sources	**Mainly public** Mixed public/private Mainly private	Many projects in the area are bilateral between two countries. Multilateral TTR-ELAt projects are funded mainly by the European Territorial Co-operation (Interreg) programme (with co-funding from other regional and sub-regional authorities).

3.1. Vision for the cross-border area

The vision for the TTR-ELAt is to foster, with a bottom-up approach, a "technology hotspot" in a knowledge-rich functional region. This vision was enshrined in the Liège Communiqué of 2008, which included the following goals:

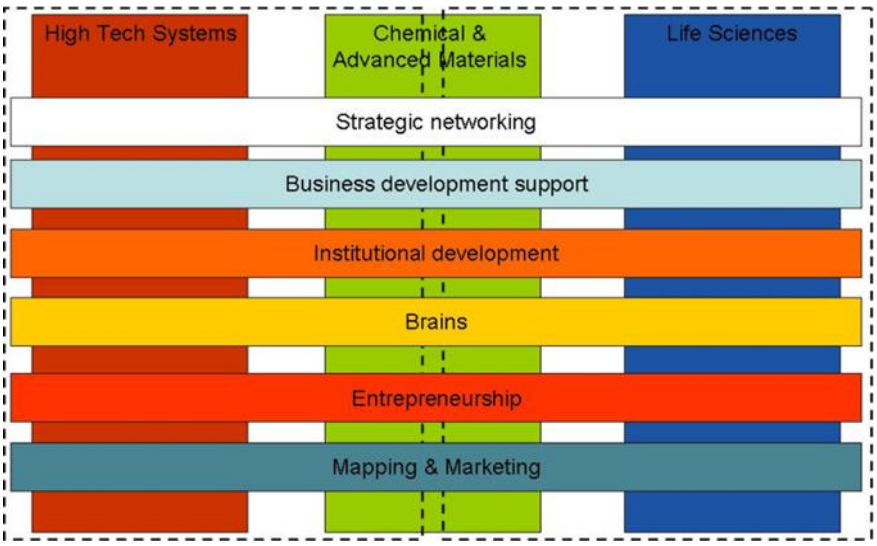
1. The aim of the TTR is to create a region that can compete internationally.

2. The focus is on three specified sectors with a major potential for innovation and capacity for growth: chemicals and advanced materials, high-tech systems and health sciences.

3. Research institutions and enterprises will play a key role in developing and executing the TTR's action programme.

The vision has been translated into a broad action plan. This action plan includes several horizontal actions as well as the three broad priority sectors. The general actions include: strategic networking, business development support, institutional development, "brains", entrepreneurship, and mapping and marketing (Figure 3.1). Some of these actions have already been achieved. Business development has been the priority focus, and resulted in development of the TTC/GCS projects. Institutional support for the governance of the cross-border area remains a weak point, but participating regional (or sub-regional) senior officials have agreed to the "menu" (i.e. variable geometry) approach to projects. The "brains" category has not yet been translated into a cross-border effort, but could be an opportunity for collaboration in the future. Efforts to support marketing, such as branding, met with difficulty given political concerns about naming conventions. The Master Class for Entrepreneurship is one of the TTR-ELAt's initiatives for that area, but actions for entrepreneurship are under-represented in the current policy mix (see Section 4.2).

Figure 3.1. **2010 Action plan for the TTR-ELAt**



Source: TTR-ELAt (2013), "Background report to OECD study cross-border regional innovation policies", March.

The TTR-ELAt vision and action plan need to be recognised in the respective regional innovation strategies. The 2008 ELAt strategy document and the TTR-ELAt 2010 action plan provide the

broad strategic directions for co-operation. Flanders, Wallonia, Southeast Netherlands (through the Brainport 2020 Strategy) and the Aachen region have all developed an innovation strategy, or at least regional development policies incorporating the innovation dimension. The future strategy Euregio Meuse-Rhine 2020 includes the specific key objective of developing a creative and innovative cross-border region, but this strategy is being developed in parallel with the TTR-ELAt. Recognition of the cross-border strategy in the respective regional strategies is therefore critical for ensuring that, beyond a few flagship multilateral programmes, the different regions are all contributing to these common cross-border goals, as was done in the Brainport 2020 Strategy for Southeast Netherlands (Box 3.1). One opportunity considered in another European cross-border region is to have observers from one side of the area participate in the regional innovation strategy development process of the other region.

Box 3.1. **Cross-border dimension at the heart of the Brainport 2020 Strategy (Southeast Netherlands)**

Brainport 2020 emphasises the importance of cross-border developments in several respects. The regional strategy includes the following points:

- **Within the domain of Technology:** The leading knowledge and technology position of the TTR-ELAt needs to be ensured and extended. In this respect, the establishment of TTR-ELAt research institutes within the main clusters (high-tech, lifetech, solar/energy, mobility) is an important element in the Brainport 2020 Action Plan. The strategy promotes actions related to joint participation in European Innovation Partnerships (EIT) and joint application and collaboration in co-locations of the EIT. The action programme also includes the establishment of a solar-valorisation programme, which has led to the Solliance consortium and the opening up of national funding instruments for innovation.
- **Within the domain of People (labour market):** Marketing and the promotion of the TTR-ELAt as an attractive region in which to live and establish an international career in technology is key. Excellent international access to and within the TTR-ELAt region is an important basis for economic growth and innovation. Stronger and better rail and road connections between important nodes in Germany and Belgium are promoted in the action programme as well as a feasibility study of a cross-border high-speed train network.
- **Within the domain of Business**, the Brainport 2020 Strategy puts emphasis on increasing the number of fast-growing innovative companies and entrepreneurship. Activities include the continuation and extension of a Master Class in High-Tech entrepreneurship at the TTR-ELAt level and the start-up of a roadmap of innovation processes (such as the TTC project).
- **Within the domain of Governance**, the Brainport 2020 Strategy emphasises the promotion of the TTR-ELAt as a European and internationally renowned Top Technology Region. Implementation of a cross-border cluster stimulus subsidy is one of the measures that has been taken in this regard, as well as the establishment of multilateral agreements with North Rhine-Westphalia, Flanders and Wallonia.

Source: TTR-ELAt (2013), "Background report to OECD study cross-border regional innovation policies", March.

3.2. Institutionalisation and multi-level governance of cross-border co-operation

The Euregio Meuse-Rhine (EMR) is a long-standing cross-border effort, and the TTR-ELAt benefits from this history of cross-border trust building and networks. The EMR, created in 1976 and institutionalised in 1991, was one of the first agreements on cross-border co-operation in Europe. It includes regions in countries which are the founding fathers of the European project and believed in the power of reducing border barriers so as to facilitate flows of people, goods and capital. The TTR-ELAt emerged 18 years after the institutionalisation of the Euregio Meuse-Rhine. It grew out of two other parallel initiatives that focused on a somewhat different geography, one that includes Leuven and Eindhoven in view of their proximity and strong technology and innovation potential. The ELAt was a 2004-08 co-operation project between the cities of Eindhoven, Leuven and Aachen (but does not include

the cities of Liège, Hasselt and Maastricht). The Top Technology Region (TTR) was initially the name given by the Dutch government to the functional region around Southeast Netherlands, further supported in Netherlands-North Rhine-Westphalia and Flanders-Netherlands co-operation agreements. A Netherlands-Wallonia agreement was signed in 2013. With the merger of the TTR and the ELAt in 2009, a larger set of regions and public actors were gathered around cross-border collaboration in the area.

There is an imbalance in the policy competencies of the cross-border area's constituent regions, rendering public cross-border governance complex. The governance of the TTR-ELAt is, by definition, difficult with regard to its composition (three countries, four institutional regimes for science and technology policies and six active partner regions). This requires a number of agreements between many institutional actors, with different policy competences. Belgian regions possess a complete spectrum of competences in innovation policy. In contrast, the participating Belgian provinces (the official partners in the TTR-ELAt) have much less scope to deploy policies and public funding to the TTR-ELAt. Dutch provinces, in contrast, are the only level between national government and municipalities. Cities and provinces are the relevant partners for the TTR-ELAt on the Dutch side. Regional innovation strategies or programmes in Southeast Netherlands are developed by programme committees which include firms and universities and involve consultation with regional stakeholders. However, national policies such as the new Top Sectors programme remain important for regional innovation system actors to access Dutch innovation-related funding. In Germany, the *Land* of North Rhine-Westphalia also has a large set of competencies in innovation policy. However, German participation in the cross-border area around Aachen covers only a small part of North Rhine-Westphalia, and this area has much more limited resources for engagement in cross-border activities. The creation of a specific structure, *Zweckverband Region Aachen*, and the presence of a regional agency (AGIT) facilitate somewhat that sub-region's engagement. A seventh sub-region, Central Lower Rhine, is not actively involved in the TTR-ELAt.

There is also an imbalance in political commitment across the different sub-regions in the cross-border area. In many respects, the Dutch side of the TTR-ELAt appears to be the leader of the cross-border region. The Dutch government is a supporter of the concept and contributes to cross-border policies to a larger extent than the other parties, both in terms of leadership and public funding such as for the GCS project (see Box 3.2). In Southeast Netherlands, cross-border co-operation in the TTR-ELAt is an integrated aspect of regional policy, both in the Dutch province of Limburg and in the Brainport 2020 Strategy (centred on Eindhoven, the Dutch "brainport"). North Rhine-Westphalia indicated its political commitment at the onset of collaboration but could be re-engaged. The political commitment of Liège Province to the cross-border efforts of the TTR-ELAt should be clarified. The March 2013 bilateral agreement between the Netherlands and Wallonia sets a more formal framework for clarifying this commitment.

The absence of an active and permanent co-ordinating body, as well as dedicated resources, hinders the strategic follow-up of the TTR-ELAt's actions. The TTR-ELAt initiative has two *ad hoc* working groups comprised of civil servants. One of the groups focuses on business development (to address three of the multilateral actions) and the other working group on public/government issues (to address the other three multilateral actions). The working groups help to develop projects that fulfil the TTR-ELAt's action plan. They met a few times separately, a few times together, and then meeting frequency dropped off but has recently picked up a bit with this study. The Province of Limburg (Netherlands) serves as the co-ordinator. There are many examples of cross-border co-ordinating bodies of varying degrees of formality, from Interreg programmes to small associations to more formal political committees (e.g., Oresund Committee, North-South Ministerial Council for Ireland-Northern Ireland [United Kingdom], or the multiple institutions of the Upper Rhine Trinational area).

As the TTR-ELAt working group is currently seeking a "light" governance approach, one option being explored is that of cross-border agreements among constituent regional development agencies (RDA) for policy preparation and implementation of activities. A first example to be tested starting from November 2013 is the collaboration between the RDAs of the Province of Limburg, Netherlands and Aachen, North Rhine-Westphalia, Germany (Box 3.2). Among the most advanced forms internationally of joint business services for cross-border areas is InterTradeIreland, a joint business support agency serving the cross-border needs of Ireland-Northern Ireland (United Kingdom) (Box 3.3).

Box 3.2. **Cross-border regional development agency collaboration: LIOF and AGIT**

A first pilot example of collaboration across regional development agencies (RDAs) in the cross-border area is underway between the LIOF (Limburg Development and Investment Company, Province of Limburg, Netherlands) and the AGIT (Regional Development Agency for the Technology Region Aachen, Germany). To better integrate the cross-border dimension in their actions, they are developing an agreement to better collaborate.

The fields pursued for joint co-operation include:

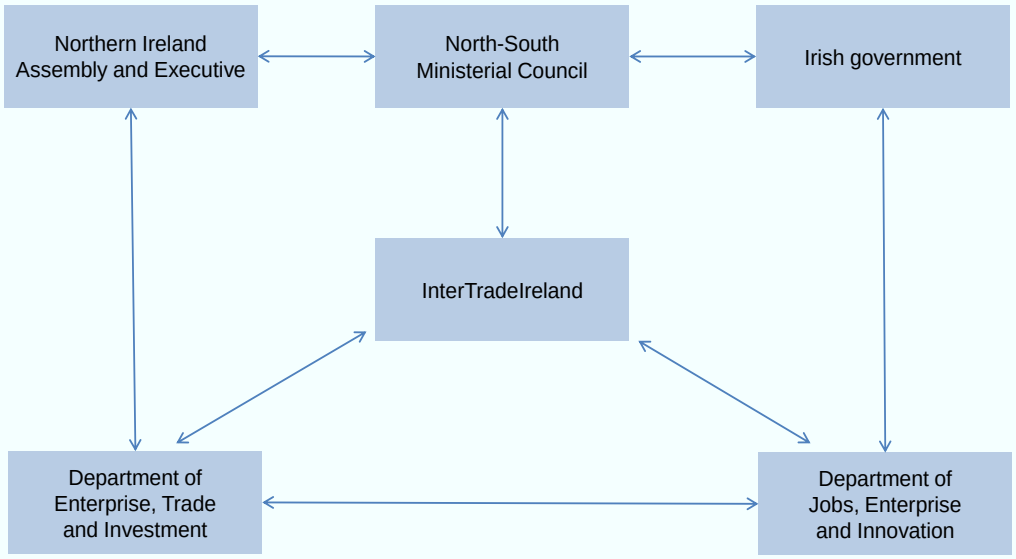
- shaping and influencing policy in order to strengthen the economic structure and economic development.
- implementation of the above policy in cross-border programmes, projects and activities.
- the development and management of cross-border (finance) tools to support these programmes, projects and activities.
- organisation and implementation of measures for the settlement of advertising and promotion of entrepreneurial co-operation through:
  - joint delegation missions to other regions and countries (outgoing)
  - support for delegations from other regions and countries (incoming)
- the development and management of cross-border networks of entrepreneurs, educational and knowledge institutions, government agencies, stakeholders and intermediaries, or the cross-border linkage of such networks in the Province of Limburg and the Aachen region in support of the economic structure and economic development.
- national and international positioning of the region, also with the goal of supporting the economic structure and its development.
- applying and managing national and international funding in favour of the above-mentioned areas of co-operation.

Source: AGIT-LIOF (Regional Development Agencies for the Aachen region [Germany] and Dutch-Limburg): Cooperation agreement-Kooperationsvereinbarung-Samenwerkingsovereenkomst, Aachen/Maastricht, October 2013.

Box 3.3. **InterTradeIreland: A unique cross-border economic promotion agency**

Cross-border co-operation on an all-island basis is institutionalised through the bodies established by Ireland and the United Kingdom in 1999, such as the North-South Ministerial Council, InterTradeIreland and the Special EU Programmes Body. These institutions provide legitimacy and continuity with respect to cross-border co-operation. There are now seven cross-border bodies and hundreds of individuals working on a cross-border basis. Several of these cross-border entities have an economic development mandate. Among them, InterTradeIreland focuses on trade and innovation (see figure below). This ensures stability and structural funding to the promotion of cross-border economic activities. It also helps to overcome paralysis due to "fair return" calculations of money invested on either side of the border. The Special EU Programmes Body (SEUPB) is another body established after the Belfast/Good Friday Agreement, with the mission to manage cross-border EU programmes.[1]

InterTradeIreland launched its activities in 1999, focusing on SMEs in particular, and with a goal of developing networks and partnerships. A range of programmes have been developed and implemented over the years with demonstration of mutual benefit to both jurisdictions. It also has a unique role in providing policy research. The team of 40 does not use branch offices *per se*, but works with the responsible entities in each jurisdiction (Enterprise Ireland and Invest NI), as well as other groups such as chambers of commerce to reach firms and in the implementation of cross-border programmes. InterTradeIreland facilitates and promotes the mainstreaming of cross-border innovation efforts by operating in close contact with relevant national and regional entities. InterTradeIreland has been focusing on all-island economic development since the beginning, however, the organisation has moved from being seen as a political entity to one that has a clear economic rationale for its activities. A second shift has been from a focus on trade to one on competitiveness more generally. Indeed, the current name is now somewhat of a misnomer, in the sense that many of its actions are focused on innovation. However, given the name recognition it has built up, the current name remains.



Note: 1. Other entities that also address economic development with an all-island remit include Tourism Ireland (since 2000) and SafeFood (since 1999).

Source: Nauwelaers, C., K. Maguire and G. Ajmone Marsan (2013), "The case of Ireland-Northern Ireland (United Kingdom) – Regions and Innovation: Collaborating Across Borders", OECD Regional Development Working Papers, No. 2013/20, OECD Publishing, Paris, http://dx.doi.org/10.1787/10.1787/5k3xv0llxhmr-en.

3.3. Funding for cross-border co-operation

There is no dedicated public funding source for TTR-ELAt initiatives. National and regional funding sources work under the principle of funding to their national or regional actors only. The TTR-ELAt's projects find their public funding sources in two ways. First, they may access Interreg funding, mainly from the Euregio Meuse-Rhine (EMR) programme. This is problematic for the Leuven

and Eindhoven areas, which are not part of the EMR and hence can only access funds given status as associated partners with lower funding rates. Second, there are opportunities to create "virtual common pots" of funding by aligning several national/regional sources behind particular initiatives. The example of the Holst Centre shows that this is possible (see Chapter 4).

The European funding sources – mainly the Interreg programme – play a key role in catalysing the cross-border efforts. Interreg Strand A funds helped to establish and sustain Euregio Meuse-Rhine actions over time. The programme was also instrumental in establishing the ELAt in 2004, and is today the main public funding source for the TTR-ELAt multilateral initiatives (including the Flanders-Netherlands and Netherlands-Germany programmes in addition to the EMR, Box 3.4). Under Interreg Strands B and C, several TTR-ELAt partners co-operate either by initiating projects or getting involved through existing networks in the cross-border area. Examples include the programmes Health4Growth and Innovate Dementia.

Box 3.4. **Interreg programmes in the area of the TTR-ELAt**

Three Interreg programmes provide funding sources for innovation in different parts of the TTR-ELAt area (the third with only a small geographic overlap with the TTR-ELAt).

1. Interreg IV-A Euregio Meuse-Rhine 2007-13

Priority 1: Strengthening the economic structure, the promotion of knowledge, innovation, and the creation of more and better quality jobs (65% of ERDF funding, EUR 72 million)

- improve economic competitiveness by developing business competitiveness
- promote technology and innovation
- promote co-operation between academic establishments and businesses
- strengthen the tourism sector and support the development of the labour market

2. Interreg IV-A Flanders-Netherlands 2007-13

Priority 1: Economic development (50% of ERDF funding, EUR 95 million)

- provide tools for private and public institutions that support entrepreneurship and innovation to collaborate across the border
- stimulate links between the academic world and the business sector in the field of research and development (R&D)
- support cross-border business activities

3. Interreg IV-A Netherlands-Germany 2007-13

Priority 1: Business, technology and innovation (58% of ERDF funding, EUR 139 million)

- promote technology and knowledge transfer between research institutes and the companies
- promote economic networks
- promote cross-border co-operation of companies and qualifications to improve the innovation potential of companies

Source: http://ec.europa.eu/regional_policy.

The Interreg funding source suffers from several serious deficiencies. Some of these challenges are related to the specific Interreg EMR cross-border area and some are related to EU programme rules more generally. Some of the common challenges in supporting Interreg programmes have been addressed in the Oresund area, where there is a close alignment between the Interreg activities and cross-border governance more generally (Box 3.5). The challenges for the Interreg EMR include:

- the intervention area was designed to solve localised border issues, but does not map to the relevant geographic area to promote innovation, an area of increasing priority for EU Cohesion Policy spending.[3]
- the traditional mode of intervention results in fragmented projects of small size, with a lack of capitalisation on past experiences.
- there is an important problem of sustainability after the Interreg funding period ends, which is partly due to insufficient private sector participation and co-funding.
- programme management is more oriented towards inputs and outputs (with a focus on intermediaries) than economic impacts (which must consider final beneficiaries).
- project selection procedures that can be long and based on local interests over quality and the impact for the region more broadly.
- an overall lack of strategic approach to ensure alignment with other regional/national/EU policies in the constituent regions.

Box 3.5. **Good practices in designing and implementing the Interreg A programme in the Oresund**

The evaluation of the Interreg IIIA programme in the Oresund highlights a number of positive factors which contribute to a more efficient implementation of this programme than in other cross-border areas in the EU. The points below refer to typical shortcomings experienced in Interreg A implementation, which are addressed in the Oresund:

- The existence of the Oresund Committee, and its central role in designing the Interreg programme, together with the role of the Oresund Secretariat in managing the programme, ensure a good co-ordination between the latter and the strategic orientation of cross-border regional policies.
- The initial Oresund programme strategy was based on a very intense diagnosis of the shared needs and problems realised at the outset, which were then used to feed the programme strategy, ensuring a good link between the SWOT analysis and the programme strategy.
- Project selection procedures are in line with the strategic goals, transparent and predictable.
- Cross-border organisations (such as the Oresund University)[1] act frequently as project initiators and leaders, building on good knowledge of actors on either side of the border and ensuring their effective commitment within an orchestrated strategy.
- The above points ensure that adopted projects are genuinely joint cross-border projects (and not parallel projects).
- A number of projects have proven sustainable beyond the project funding period.

Note: The Oresund University, which also played a strong Interreg programme administration role, is no longer in operation.

Source: Möller, K. (2010), "Ex-post evaluation of the Interreg III Community initiative funded by the ERDF: Evaluation of the Interreg IIIA Oresund (Denmark/Sweden)", report to the European Commission, Brussels.

3.4. Barriers for cross-border co-operation linked to governance and funding issues

Governance complexities exist on many levels, and the creation of multiple area definitions further complicates public efforts. The long history of cross-border collaboration among the areas covered by the TTR-ELAt is a positive factor improving the area's functional ties. However, the successive creation of new cross-border region definitions, instead of adapting existing ones, results in a fragmentation of public efforts. Governance issues also suffer from two imbalances: imbalance in institutional powers and imbalance in political commitment among the constituent regions/sub-regions. The mismatch between the strong potential of the area and the difficulties in governance with so many sub-regions is a serious challenge.

A main limitation for cross-border co-operation in innovation is the lack of alignment of policies on both sides of the border in terms of strategy and funding. The current development of several "smart specialisation" strategies in compliance with EU requirements, with few connections across most of these exercises, is a missed opportunity for cross-border co-operation. These processes would have been an opportunity for the TTR-ELAt vision and action plan to be endorsed by authorities in the respective regions. The lack of clear and measurable target objectives for the TTR-ELAt action plan also detracts from a wider endorsement of the strategy. Despite the presence of Interreg funding, without which much less cross-border co-operation would have taken place, this is a limited funding source with respect to overall public funds for innovation in the cross-border area, and there are several challenges for innovation-related Interreg spending (see above).

Identity and branding of the area remain a challenge. The TTR-ELAt is not visible to many cross-border actors or residents and the governance challenges do not help to promote it internally or externally. This is not just an issue of marketing for the benefits of politicians, it is an essential component of a strategic policy which needs the endorsement of a large constituency, and it is a necessary element to stimulate the exploitation of cross-border innovation potential, especially for SMEs, and to attract and retain talent and firms in the area. Recognition of the cross-border area by its residents also gives local and regional politicians further reason to be interested in supporting the TTR-ELAt.

CHAPTER 4

TOP TECHNOLOGY REGION-ELAT CROSS-BORDER INNOVATION POLICY MIX

4.1. Cross-border initiatives and policy instruments

The TTR-ELAt stands out in international comparison for the number and breadth of innovation-related instruments. These instruments span the whole range of the policy cycle, from analytic reports to joint R&D infrastructure, cross-border R&D funding programmes and clusters, and joint S&T and innovation centres (Table 4.1).

Table 4.1. **Cross-border policy instruments in the TTR-ELAt**

Instruments	Presence in the TTR ELAt
Strategy and policy development	
Benchmarking and policy learning	
Analytical exercise (like mapping of clusters or value chains, technology foresight exercises)	– BAK Basel Economics reports (on innovation performance and areas of technological expertise in international comparison)
Joint branding of the cross-border area	– ELAt Investment Forums
R&D support	
Joint public research programmes	
Joint research infrastructure, shared access to research facilities	– Holst Centre, joint initiative from the IMEC in Flanders and the TNO in the Netherlands – Forthcoming Biomaterials Research Centre, a joint Dutch-German initiative (AMCBM)
Cross-border private R&D funding programmes (generic and thematic)	– GCS (Cross-Border Cluster Stimulation Fund) project: grants for cross-border R&D projects involving SMEs
Technology transfer and innovation support	
Cross-border innovation advisory services (vouchers, intermediaries)	– TeTTRA: promotion of academia-SMEs linkages and of SMEs recruiting in non-urban areas of the TTR-ELAt – BiELAt Foundation (networking events to support firm matchmaking)
Advisory to spin-off and knowledge-intensive start-ups	-AC2 start-up competition, EUBAN
Other technology transfer centres and extension programmes	-Leuven-Inc
S&T parks and innovation networks	
Cross-border science, technology parks and incubators	– Avantis and EURODE (Netherlands-Germany) – AMIBM on Chemelot Chemical Campus (Maastricht University and Rheinisch-Westfaelische Technische Hochschule – RWTH – Aachen)
Cluster or network initiatives	– Top Technology Clusters (awareness raising, soft business support, innovation vouchers) – Cross-border automotive cluster ACEMR – Energy Hills (Aachen-Dutch Limburg) – DSP Valley (smart systems and embedded technology solutions)
Human capital investment	
Scholarships/student exchanges	
Joint university or other higher education programmes	– Transnational Limburg University (joint Flanders and Netherlands) – Executive Master in medical imagery Jülich-Maastricht – ELAt Master classes in entrepreneurship
Talent attraction, retention or mobility schemes and support initiatives (like cross-border placement or information for cross-border commuters)	– Info points for border commuters
Other	
Financing (venture capital funds or angel networks)	– Euregional Business Angels Network
Joint public procurement	

Source: Listing of instruments derived from TTR-ELAt (2013), "Background report to OECD study cross-border regional innovation policies", March; presentations during OECD mission, 13-15 March 2013.

Cross-border innovation initiatives in the TTR-ELAt take the form of time-bound projects funded mainly by the European Territorial Co-operation (Interreg) programme. Interreg funding is a core source of funding for joint actions, with TTR-ELAt member regions co-funding them. The Top Technology Clusters and Cross-Border Cluster Stimulation Fund projects (Box 4.1) were created to support business development and use Interreg funding more strategically. A limitation of these two programmes is that the eligible territory is restricted to the Euregio Meuse-Rhine (see Chapter 3). The GCS project also seeks to improve the selection process for the use of Interreg for innovation (more transparent and expert-based selection methods, a focus on SMEs instead of intermediaries and a clear timeline for selection procedures).

For many programmes and initiatives, sustainability of funding remains an issue. Indeed, the project-driven approach, often using Interreg, results in project termination when the initial public funding stops. Greater private co-funding or alignment of national funding sources could help promote the sustainability of strong initiatives. Notable exceptions to this project-based funding include structural initiatives involving mainstream national sources of funding such as the Dutch-Flemish Holst Centre (Box 4.2) and the Transnational University Limburg (Box 4.3).

Box 4.1. **Top Technology Clusters and the GCS (Cross-border Cluster Stimulation Fund)**

The **Top Technology Clusters (TTC)** project aims to stimulate innovation-oriented co-operation of companies by creating cross-border, SME-based co-operation consortia in four fields corresponding to the TTR-ELAt's strengths: ICT, energy, advanced materials, and life science. The TTC project is led by the AGIT (Aachen regional development agency) with a budget of EUR 5 million. The TTC is run by 19 partners (regional development agencies, innovation agencies, cluster organisations, universities) across the regions of the TTR-ELAt. It uses three instruments with cross-border characteristics:

1. networking events (socialising, B2B, brokerage) across the TTR-ELAt area.
2. business development support managers and activities.
3. innovation vouchers for studying the feasibility of joint cross-border innovation projects: free research/advice from a knowledge provider within the Greater Euregio Meuse-Rhine (EMR) area up to an amount of EUR 5 000 to stimulate cross-border SME-based co-operation consortia.

Decisions on voucher applications are taken by an *ad hoc* group of TTC partners. In total, through September 2013, 22 vouchers with 72 partners had been awarded. The first results are promising; with a total of 49 partners involved in the voucher projects, and 3 out of 4 partners are SMEs. The main domains for which the vouchers have been used are: energy, life sciences and high-tech systems. There is also a balance among the cross-border regions, with five consortia led by a German SME, four by a Dutch SME and four by a Belgian SME.

The **Cross-Border Cluster Stimulation Fund (GCS)** is a joint fund stimulating cross-border co-operation in the EMR area which also supports the TTR-ELAt's objectives. It is managed by the LIOF, the regional development agency of Limburg Province, Netherlands. The GCS provides innovation funds to complement the TTC project which operates at an earlier stage of collaboration. The GCS funds cross-border SME-based R&D projects, with individual funding between EUR 100 000 and EUR 250 000 per business case, for up to 18 months. The principles are that at least two SMEs from two different countries (including at least one SME in the EMR) must participate. Large companies and universities may participate.

An external expert committee ranks the proposals, based on the following selection criteria: technological and scientific strengths (10%); innovation level (20%); potential market success (40%); European co-operation (maximum 15%); and personal contribution of funding (maximum 15%). The Interreg Steering Committee gives formal commitment to the best-ranked proposals. In the first wave (end of 2012), 8 projects were supported, for a total budget of EUR 5.6 million, with grants of EUR 2 million being 36% of the budget for those projects. A second selection round in mid-2013 resulted in 14 additional R&D projects. In total, the GCS will foster 22 SME-based cross-border innovation projects with a funding amount (directly for the individual co-operation consortia) of EUR 4.7 million.

Box 4.1. **Top Technology Clusters and the GCS (Cross-border Cluster Stimulation Fund)** (*cont.*)

Funding sources are unequally spread between the TTR-ELAt partners, with a dominance of Dutch funding:

Contributor	Contribution in euros
Interreg	2 290 000
Ministry of Economic Affairs (NLD)	2 000 000
Limburg Province (NLD)	200 000
North Brabant Province (NLD)	200 000
Land North Rhine-Westphalia (DEU)	200 000
AGIT (DEU)	9 000
Limburg Province (BEL)	180 000
IC Limburg (BEL)	20 000
Wallonia (BEL)	240 000
Flemish Brabant Province	200.000
Total	5 539 000

Source: Presentations to the OECD mission, 14 March 2013.

Box 4.2. **Holst Centre: A joint research centre between the Netherlands and Flanders (Belgium)**

A remarkable initiative in the TTR-ELAt area is the cross-border Holst Centre. It was established in 2005 by Imec (Flanders, Belgium) and the TNO (the Netherlands) with the support of the Dutch Ministry of Economic Affairs and the government of Flanders. It is named after Gilles Holst, the first Director of Philips Research. It is an independent open-innovation R&D centre that develops generic technologies for wireless autonomous sensor technologies and flexible electronics. A key feature of the Holst Centre is its partnership model with industry and academia, based around shared roadmaps and programmes.

This jointly funded cross-border institute is situated on the High Tech Campus Eindhoven and has grown to over 180 employees with 28 nationalities, and a commitment from almost 40 industrial partners. To co-ordinate the activities at the Holst Centre, Imec set up a separate legal entity, the Stichting Imec Nederland (imec-nl). However, the centre operates under a virtual common pot, meaning that funds from the different sources are not co-mingled and contracts with firms are signed with one or the other underlying entities from only one side of the border. Strong links with parent organisations have been critical for the rapid growth of the Holst Centre and help to successfully attract talent and establish research partnerships. While most of the programmes co-ordinated by the Holst Centre are executed at the High Tech Campus in Eindhoven, a number of projects rely on close collaboration with Imec groups in Leuven, India or Chinese Taipei and with the TNO groups in various locations in the Netherlands.

The Dutch Ministry of Economic Affairs supported the Holst Centre during its start-up period from 2005 to 2012. The total amount of public funding required to enable further growth of the Holst Centre in the coming four years is estimated at EUR 72 million. This budget was made available in 2012, combining efforts of several governments and organisations: the Dutch Ministry of Economic Affairs, Agriculture and Innovation; the Province of North Brabant; the Brainport Eindhoven region; Imec in Flanders; the TNO; the Dutch Organisation for Scientific Research (NWO); and a fiscal ruling (called “TKI toeslag”) issued by the Dutch government.

Source: TTR-ELAt (2013), “Background report to OECD study cross-border regional innovation policies”, March; presentation to the OECD mission, 13-15 March 2013.

Box 4.3. **Transnational University co-operation in the TTR-ELAt**

The Maastricht University (UM) in Dutch Limburg was established in 1976, and is the youngest of the 13 public universities in the Netherlands. With approximately 16 000 students (2012) and, together with UMC+, about 9 000 staff members and a turnover of about EUR 800 million, it is a major force for the region. The university's profile consists of three unique elements: 1) problem-based learning (PBL) and innovation in education; 2) an international orientation based on firm roots in the Netherlands, Limburg and the Euroregion; and 3) an integrated, multidisciplinary and interdisciplinary approach to research and education with a focus on three themes (quality of life, Europe and a globalising world, and learning and innovation).

The Hasselt University in Belgian Limburg is also a young university established in 1971 with undergraduate and postgraduate programmes in the fields of medicine, dentistry, sciences, law and applied economics.

In 2001, the Flemish and Dutch Ministers of Education signed an international treaty which founded the Transnational University Limburg. Academic staff from Hasselt University and from nearby Maastricht University (in the Dutch Province of Limburg) now jointly undertake research and offer degree programmes in life sciences and computer sciences.

Transnational co-operation also exists between the University of Liège and RWTH Aachen, particularly in mechanical engineering and research where an innovation-intensive partnership has been in place more than 10 years.

Source: TTR-ELAt (2013), "Background report to OECD study cross-border regional innovation policies", March.

In addition to these programmes, the TTR-ELAt vision is supported by a large set of experiments through projects of a temporary nature. Joint R&D projects involving public and private research actors from several of the partner regions are ongoing, many with Euregio Meuse-Rhine Interreg funding support (Microbiomed, Biomimedics, Organext, Nacahtt, Alma in silico, etc.). These projects actively involve leading universities and research centres in the cross-border area such as the University of Liège, RWTH-Aachen University, Hasselt University, Maastricht University and IMEC. The domains involved tend to correspond to the three priority areas of specialisation of the TTR-ELAt. Other Interreg-funded projects and consortia within the Germany-Netherlands and Flanders-Netherlands Interreg programmes fund innovation promotion in parts of the TTR-ELAt only, in fields such as food technologies (Food Future), ICT applications (RFID), eco-production (ECO2profit), materials technology (Cross Roads, TKV Functional surfaces), biomaterials (Biomat-IN, advanced bio-based materials), ICT for health (Brains Unlimited), smart mobility (Street Scooter), energy technologies (Solliance consortia for R&D on thin film photovoltaic solar energy), etc. In addition to these numerous projects that have received some form of public funding, other co-operation takes place without public intervention. Such private collaborations fuel cross-border innovation from a bottom-up perspective.

4.2. Untapped potential for promoting cross-border innovation synergies

The development of structural (as opposed to temporary) cross-border initiatives relying on the alignment of regional/national initiatives on both sides of the border is an opportunity. The existing TTR-ELAt policy mix relies mostly on external funding sources of limited duration, mainly the EMR Interreg programme. There are opportunities to align funding sources on different sides of the border to pursue common goals while tapping into a more diverse source of expertise. This can target notably: the extension of cluster or competitiveness poles policies; the openness of incubator services; and the extension of university technology transfer offices and support to academic spin-offs across borders.

Reaching critical mass and synergies in public research can also be developed further. The examples of the Transnational University Limburg, the Holst Centre and the AMIBM may pave the way towards similar initiatives involving other HEIs and public research centres in the TTR-ELAt. There are

some international examples of joint research initiatives on areas of common priority, such as between Finland and Sweden for wood materials science and engineering (Box 4.4).

Box 4.4. **Joint Finnish-Swedish research programme in wood material science and engineering**

The Wood Material Science and Engineering (WMS) Research Programme (2003-07) is a joint Swedish-Finnish programme with the aim to improve the competitiveness and sustainability of European forestry and forest-based industry. The programme is a first attempt to align several national public funding sources from the two countries:

- in Finland, the projects were funded by the Ministry of Agriculture and Forestry, the Academy of Finland and Tekes.
- in Sweden, the financers were VINNOVA and the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning.

The budget of the WMS Programme was EUR 19.7 million and it involved 317 researchers from 29 research units and more than 70 partner organisations from the 2 countries. The WMS programme funding was organised as a "virtual common pot" in which one programme virtually combines different existing funding mechanisms. The benefit of this approach is its flexibility at the programme level, while at the same time, the decisions and management of individual projects remain in the hands of each funding organisation. To a large extent, the WMS projects were curiosity driven rather than mission oriented.

The programme was successfully concluded and had a valuable impact, particularly with respect to:

- The definition of the programme's scope was systematic and project selection ambitious. The programme managed to advance top-level research in fields that were considered relevant within academia, the five funding organisations and industry. In these areas, scientific output was extensive (articles, degrees), particularly in relation to its rather limited duration and volume of funding.
- There has been a positive contribution in bringing Swedish and Finnish researchers closer together. Several excellent research projects would not have started without the WMS programme. The transnational research collaboration has continued in many projects after the programme, but rather at the individual level than at institutional or research group level. Existing networks have continued and have been strengthened and some new cross-border collaborations have emerged. Researchers and industry value getting to know new partners for potential future collaboration.
- The competence and readiness of the five research funding agencies to organise transnational research programmes has significantly improved through the joint learning process of the WMS programme. This has had immediate positive implications.

Source: Halme, K., S. Kanninen, K. Viljamaa, E. Arnold, T. Åström and T. Jansson (2008), "Creating cross-border competence: Impact evaluation of the Wood Material Science and Engineering Research Programme", *Tekes Programme Report*, n°2.

Better knowledge of the assets available across the cross-border region is a prerequisite for identifying and building on the region's potential. Knowledge accumulated through past and ongoing experiments, such as the TTC and the GCS projects, can form a basis for an integrated knowledge base. Information on participation in FP7 programmes can also be used to highlight specific strengths and existing collaboration networks. The work of the Euregional network of business angels and the TTR-ELAt investment forums may help to identify matching possibilities among firms, or between firms and research institutions, across borders.

The areas of specialisation of the TTR-ELAt have already been identified, but may be further mapped out. The BAK Basel Economics benchmarking exercise has been helpful in identifying the areas of expertise of the TTR-ELAt actors in the different constituent regions. The TTR-ELAt hosts strong business networks throughout the cross-border area in high-tech systems, especially in the automotive sub-field (Flanders Drive, Automotive NL, car e.V.) and ICT (DSP Valley VZW, Stichting DSP Valley, REGINA e.V). The broad life science area, with its sub-fields of medical imaging, bio-monitoring and bio-control, e-health, bio-electronics, drug development, cardiovascular diseases, nutrition and health, is also

subject to many cross-border industry-science co-operations as well as joint research and education programmes (Executive Master in medical imagery Jülich-Maastricht, Biomaterials research centre, etc.). A relatively newer domain to be further explored for joint action is the field of energy (e.g. the Energy Hills network and Solliance). For all of these domains, it will be important to develop a clear picture of the outputs and impacts achieved by various Interreg projects and other initiatives to support new developments in existing (or new) areas of specialisation. A mapping in the cross-border area of Ireland-Northern Ireland (United Kingdom) of the agro-food sector is an example of the kinds of further analyses and possible actions that could support the different areas of specialisation for cross-border activities in the TTR-ELAt (Box 4.5).

Box 4.5. **Cross-border potential in the agro-food sector: Ireland-Northern Ireland (United Kingdom)**

- Take steps to increase awareness and stimulate cross-border proposals under FP7, e.g. workshops and road shows to promote the programme and provide advice to potential applicants.
- Publicise a roadmap of food sector research expertise and use it to stimulate collaboration across the island in order to access EU funding streams.
- Designate centres of excellence to share capacities and technologies across institutions; use a roadmap to help define.
- Consider cross-border application of future major inter-company/research institute R&D projects being supported by state agencies.
- Continue the development of a strategic leadership programme for CEOs/senior management open to suitable food companies from both jurisdictions (similar to EI's Leadership 4 Growth programme in the IT sector).
- Investigate the development of a cross-border graduate placement programme (incorporate/extend INI Knowledge Transfer Partnership, EI Graduate Placement & IBEC Market Orientation Programme).

Source: InterTradeIreland (2011), *Agri-Food: A Study for Cross-Border Co-Operation*, InterTradeIreland, May.

The policy mix has few items with respect to the entrepreneurship pillar of its strategy. Like the TTR-ELAt, Ireland-Northern Ireland (United Kingdom) has developed a special class for entrepreneurship. The Innovation Academy is a joint initiative of three leading universities to foster cross-border doctoral researcher mobility and inter-institutional sharing of modules for innovation and entrepreneurship training in doctoral schools. Other cross-border areas have placed greater emphasis on the networking among financers, incubator residents and others active in the start-up community. Several examples from other cross-border areas may provide inspiration for the TTR-ELAt. For example, an important element of the Helsinki-Tallinn cross-border area collaboration for innovation is the start-up community and joint actions for its further development (Box 4.6). Ireland-Northern Ireland (United Kingdom) has also promoted angel investing cross-border, notably through the InterTradeIreland programme HBAN (Box 4.7).

Box 4.6. **Promoting start-ups: Examples from the Helsinki-Tallinn cross-border area**

Start-smart is a co-operative cross-border project financed by Interreg IV A Programme 2007-2013, Southern Finland-Estonia. The partners are: the Estonian Development Fund (lead partner), the Small Business Center of Aalto University in Finland, BDA Consulting OÜ, Enterprise Estonia and AS Technopolis Ülemiste in Estonia. The aim is to support entrepreneurial attitudes in both countries and accelerate the emergence of innovative enterprises. Activities include: workshops and seminars in Estonia and Finland with international speakers; start-up demo pitching nights; a mapping of the Estonian and Finnish start-up ecosystem; a start-up database; one-to-one mentoring; one-to-one consultancy (for business plan development, business modelling or marketing) and awareness raising via social media channels.

The Cross-Border Small Business Environment project established a network between southern Finnish and Estonian business incubators, with the goal to develop the business activities and competitiveness of the Finnish and Estonian companies participating in the project in three main activities:

- network development of Finnish (southern Finland) and Estonian business incubators.
- the development of a training programme for the managers of business incubators and technology parks, which included a best practice exchange and implementation.
- the provision of support and information services for Finnish and Estonian companies in developing their business activities and competitiveness.

The project has provided market surveys, consulting, training services and thematic seminars for southern Finnish and Estonian SMEs. Participants in the project gained new business partners and customers, as well as knowledge about the Finnish-Estonian business environment and cross-border business opportunities.

Source: Presentation during the OECD visit, April 2013; www.pyk.hkkk.fi/crossbent.

Box 4.7. **HALO Business Angel Network (HBAN)**

Although in its early stages, this cross-border policy instrument is unique for its emphasis on an under-represented area in innovation policy, financing support through business angel capital. Launched in 2011, the HBAN is an all-island umbrella platform for business angel investors focusing on Ireland and Northern Ireland. This network has the aim to:

- stimulate angel investments.
- empower angel investors to build and maintain an investment portfolio.
- streamline the funding process for firms..

The HBAN works on a regional basis, by establishing partnerships with business innovation centres in Dublin, Cork, Waterford and Galway as well as with Halo Northern Ireland. Each of these centres runs local angel networks at a smaller scale. Trust and local social networks are crucial conditions for the well-functioning of syndicates, but at the same time gaining a sufficient critical mass is important to diversify investments. It has a network of seven investor syndicates as well as a large pool of private investors that operate on a cross-border basis. It also collects data on investors and has a database of about 150 private investors ready to meet early phase entrepreneurs. It aims to establish an all-island syndicate of investors in the near future. The HBAN organises matchmaking events between investors and entrepreneurs and it has recently launched a guide for entrepreneurs called *Raising Business Angel Investment. Insights for Entrepreneurs*.

Source: InterTradeIreland (2013), "Ireland/NI background report for OECD study on cross-border regional innovation policies", January; interviews during the OECD mission 28-30 January 2013; www.hban.org.

4.3. Relevance and effectiveness of the policy mix for cross-border co-operation

Table 4.2. **Snapshot of the innovation policy approach**

(TTR-ELAt in bold)

Element of policy mix	Definition	Degree
Information	Mutual exchange of data, actor mappings and policy information	Strong **Moderate** Weak Not present
Experimentation	*Ad hoc* and temporary common initiatives without joint funding	**Strong** Moderate Weak Not present
Alignment	Mutual opening of programmes or structures across borders – no joint funding	Strong Moderate **Weak** Not present
Joint actions narrow	A few cross-border measures, structures and actions with joint funding by actors from several regions	**Strong** Moderate Weak Not present
Joint actions broad	Many joint instruments co-funded by the constituting regions	Strong Moderate **Weak** Not present
Strategic policy mix	Joint common strategy adopted at the level of the cross-border area, translated into common policy mix co-funded by all constituting regions	Strong Moderate **Weak** Not present

The cross-border area benefits from many bilateral and a few multilateral projects. Most projects within the cross-border area involve only a subset of the TTR-ELAt partners. The Top Technology Clusters and the GCS (Cross-border Cluster Stimulation Fund) projects are among the few examples of multilateral efforts that involve joint funding from all constituent regions, albeit contribution shares vary widely. The lead role taken by the Dutch government (which funds the major part of the GCS project) will hopefully help to demonstrate the feasibility of such cross-border programmes, where national money flows over the border.

Largely missing today in the policy mix are efforts to open existing regional and national programmes to allow partners from the whole TTR-ELAt area to access the programmes. Mutual exchanges on policies occur on an *ad hoc* basis when partners collaborate on concrete projects, but not yet in a systematic way at strategic policy-making level.

CHAPTER 5

RECOMMENDATIONS FOR CROSS-BORDER INNOVATION POLICY IN THE TOP TECHNOLOGY REGION-ELAT

The TTR-ELAt is one of the most advanced European experiments in building an innovation-driven functional cross-border region. With its strong endowments and exemplary cases of cross-border partnerships for innovation, the Top Technology Region-ELAt area has many elements of a functional region for innovation. The development of the Euregio Meuse-Rhine, then the additional ELAt co-operation, and subsequently the Top Technology Region and now the joint TTR-ELAt, reflects a collective willingness to put innovation at the heart of the cross-border partnership. Economic structures and strong innovation resources on all sides of the border present both complementarity and diversity, with a realistic potential for capitalising on proximity to create local advantages in internationally competitive niches. A number of key actors in the region (multinational companies, research centres and sub-national public actors, as well as Dutch national and regional governments) have identified this strong potential and promote open innovation and public-private collaboration.

The TTR-ELAt has passed the stage of experimentation and can further intensify its current efforts toward more strategic policy with associated funding. There is a fertile ground for a cross-border regional innovation system. The cross-border area has completed the stage of experimentation and can strengthen its strategic policy approach. While this transition has already started, it is still in the early phases.

The exploitation of this potential is not straightforward, given governance challenges as well as incomplete knowledge on assets and opportunities on the various sides of the borders. There is a role for policy to help overcome these barriers, and this goes along with a more sustainable governance approach of the cross-border area. There is a mismatch between the potential for innovation-oriented growth and the weak governance to support the area's cross-border efforts. Several of the recommendations below have been raised in the past within the cross-border area; therefore a greater understanding of why certain recommended actions have not worked well in the past would help in reconsidering new approaches to addressing such persistent challenges.

5.1. Cross-border area

Adopt an innovation-driven definition of the cross-border area with a variable geometry for bottom-up activities

- **Use the TTR-ELAt definition as the relevant cross-border area for innovation-related funding and analysis, to be recognised by supranational, national, regional and local governments.** This definition includes the most innovation-intensive cities in proximity that share several industrial, technological and scientific strengths. The TTR-ELAt resulted from the merger of two entities that sought to complement the Euregio Meuse-Rhine by including relevant innovation centres such as Leuven and Eindhoven that were are not in the Euregio area definition. Competing cross-border area definitions reflect a historical focus on solving border problems but are not as helpful for the innovation-driven efforts sought for the future development of the cross-border area. Competing definitions also complicate both the governance landscape and efforts to develop a common brand and identity.

- **Maintain the variable geometry approach for programming to preserve the pragmatic and bottom-up philosophy of TTR-ELAt**. This approach will support different bilateral as well as multilateral efforts among constituent areas based on opportunities as they arise. Not all constituent regions need to participate in all projects, but there are some public good activities that should be co-financed by all. For specific projects, the "money for all" principle does not support decisions focused on quality and impact criteria, as evidenced in programmes in other cross-border areas where greater emphasis is placed on checking boxes for different jurisdictions than on potential impact. Variable geometry, as previously agreed by participating regional officials, is a key principle to be maintained. This approach will also serve to preserve some degree of openness to relevant actors outside of the TTR-ELAt so as not to set new borders. The focus should be on mobilising actors benefitting from advantages of proximity to develop original combinations for new products and services with a growth-enhancing effect for the cross-border area. For example, some actors in Brussels may be relevant in certain cases where an advanced service industry is needed.

- **Collect data and communicate on cross-border facts and trends to help the constituent regions demonstrate the importance of joint action as well as measure policy impact.** There is a need to improve the knowledge base in the TTR-ELAt with respect to its integration as a cross-border area, as well as its potential and opportunities for innovation. Studies from BAK Basel Economics have shed light on the strengths of the TTR-ELAt and are very useful to provide an evidence base for cross-border efforts. However, these studies concentrate on economic and scientific critical mass (based on gross value-added shares, patents and publications) but do not capture interactions across the borders. Developing a better knowledge about directions and content of flows (of people, knowledge, innovation collaborations, etc.) across the TTR-ELAt would help improve the governance of the cross-border area and provide a basis to develop the policy mix. Such data and information would also be helpful to garner support from citizens, firms and higher levels of government. The Oresund cross-border area, for example, is supported by several institutions such as Orestat and the Oresund Institute for statistics and analysis. The cross-border area of Ireland-Northern Ireland (United Kingdom) also has a statistics portal to inform its work (AIRO).

- **Brand the cross-border area more effectively to support an internal identity and greater external visibility.** The TTR-ELAt denomination is unclear, not inclusive, and reflects governance challenges. Consultation of key actors already identified through pilot projects and of a wider constituency can support internal visibility, by understanding the substance of the co-operation (key fields, main opportunities and main barriers). These consultation processes could also support branding goals through some review of possible names, be it simply Top Technology Region or something else. A possible contest for the name and logo could engage communications students on a cross-border basis, further raising internal visibility. Branding issues are a challenge for many cross-border regions given political considerations for balance in representation, but that of the TTR-ELAt is particularly confusing. Other developed cross-border areas also seek to promote an internal identity through efforts to create greater interactions among citizens more generally across the border, through the job market or through cultural events and cross-border magazines, to complement the more innovation-driven linkages.

- **Continue to signal to relevant national (and in some cases regional) authorities significant cross-border integration barriers, such as regulations, transport connectivity or tax and pension issues restraining labour market mobility.** The TTR-ELAt's efforts are rightly focused on innovation-related efforts for greater impact given the limited source of funds. However, the effectiveness of complementary policies that allow people and firms to more easily act on a cross-border basis will also support these innovation-related goals. Facilities for firms to

work across borders, reduced travel times within the cross-border area and easier regulations or clear information for cross-border commuting provide more favourable conditions for the cross-border area's innovation system. In the Oresund, for example, different elements of integration are tracked using the Oresund Integration Index. The area also has a common website and one-stop-shops to help newcomer firms and workers navigate the cross-border area. The Oresund Committee, for example, maintains a common list of regulatory and administrative barriers that is used to lobby national policy makers to address those identified barriers, one by one.

5.2. Governance

Promote a stronger co-operation platform for TTR-ELAt with a strategic intelligence role, building on greater involvement of the relevant public and non-public actors

- **Maintain a coalition governance structure given the challenges of formalising governance.** The TTR-ELAt area spans three countries, four science and technology policy regimes and six partner regions as well as multiple cities, all rendering the governance system complex. Most of the existing cross-border collaborations are on a bilateral, not a multilateral, basis. A flexible approach should ensure that any one partner region does not block actions of the rest of the group. An alignment of expectations and visions from the various governmental authorities involved is nevertheless important, and could be codified in different regional and city strategies. However, agreement on all of the TTR-ELAt's actions across all partners may be too cumbersome to achieve.

- **Invite regional authorities from Flanders and Wallonia (Belgium) and re-engage North Rhine-Westphalia authorities (Germany) in the TTR-ELAt cross-border efforts, for political awareness and policy support.** These regional authorities have the policy competencies to support the cross-border innovation efforts relevant for the participating provinces. This is a missing element that can be corrected, given the strong interest that these regional governments have in fostering technology and innovation as a driving force for regional development. Some periodic events are needed for basic political awareness. For the day-to-day work of developing joint policies and projects, having the relevant public actors involved could increase the potential impact of the TTR-ELAt's goals.

- **Promote a stronger co-operation platform for the TTR-ELAt to support policies and to provide relevant information and analyses.** The role of the TTR-ELAt co-operation platform would be to gather and diffuse information on cross-border innovation-oriented data, initiatives and policies and to support the joint policy process. It is difficult to finance a large Secretariat (the Oresund Committee, for example, has a Secretariat of ten) but the current commitment of a few individuals for a small fraction of their time renders any progress extremely difficult. Functions could be supported by constituent regions but with a clear indication of the in-kind contribution of public staff time. It would be helpful if at least one person in the TTR-ELAt had cross-border collaboration as his/her primary responsibility. An alternative is for the constituent regions to support some of these activities through existing organisations, but for the relevant geographic footprint (see below), developing and communicating around successful cross-border experiments such as the Holst Centre or Top Technology Clusters and the GCS, with a clear insight on the impacts achieved and identifying the value-added brought by the cross-border dimension. This would also help to reinforce political commitment to cross-border efforts. Functions that need to be reinforced in the TTR-ELAt area include:

- Exchange of information on national/regional policies between policy makers at the relevant levels in all parts of the TTR-ELAt (a peer cross-border area is considering having observers from the other side of the border involved in the respective regional strategy development processes).

- Collect policy-oriented data and information (with possible use of surveys) on cross-border innovation flows and initiatives, covering projects and firms which have not benefitted from public funding as well (for example, InterTradeIreland conducts regular surveys of firms beyond programme participants for its cross-border area).

- Involve relevant governmental authorities and agencies to identify gaps and adjust the cross-border innovation policy mix.

- Analyse the impacts of policies as an evidence base for the strategic orientation and to show value-for-money of cross-border initiatives, including showcasing of the impacts of successful cross-border initiatives.

- Develop mappings of SMEs, technology providers and other key stakeholders to facilitate relevant collaboration within the cross-border area that does not currently occur due to lack of knowledge (for example, the Upper Rhine Trinational Metropolitan Region has progressively expanded its mapping of relevant firms and other innovation actors in the last couple of years).

- **Seek greater coherence between the Euregio Meuse-Rhine and the TTR-ELAt geographies through alignment or other means for strategic use of European Territorial Co-operation innovation-related funds, data collection and policy intelligence.** The EMR Interreg area covers much of the TTR-ELAt area, but excludes some key areas for innovation. If possible, the cross-border area would benefit from expanding the geography of the Euregio Meuse-Rhine to map to that of the TTR-ELAt to enable greater coherence among various cross-border efforts. This could take place through different channels: 1) actual alignment of the geographic areas; 2) an alignment with the TTR-ELAt footprint only for innovation spending by the Euregio; or 3) a greater use of the 20% for outside areas like Eindhoven and Leuven (currently only 5% has been used). It would be a missed opportunity to have the Euregio starting to provide data, policy intelligence and programmes in a way that does not support the overall region's economic development, particularly as an increasing share of Euregio funds will be dedicated to innovation. In an evaluation of the Oresund Interreg funding, one of the identified success factors was the fact that the Oresund Committee Secretariat supported the overall cross-border collaboration as well as the Interreg programme.

- **Involve firms and knowledge actors (triple helix) to work in co-operation with public actors to support cross-border strategies and actions with bottom-up involvement.** Governance structures for cross-border collaboration in Europe are often exclusively composed of public actors (exceptions being, for example, the private sector board members of InterTradeIreland). In the case of the TTR-ELAt, which lacks a formal cross-border entity, options to better include the private sector include expert groups or even ownership of a key initiative in the TTR-ELAt action plan. For example, in the Upper Rhine Trinational Metropolitan Region, the economy pillar co-ordination group involves the relevant chambers of commerce in the area, and the science pillar groups the relevant higher education institutions and research entities. Open innovation environments could also be used to accelerate triple helix collaborations.

5.3. Innovation policies and instruments

Develop a pragmatic strategy and align public funding to the strategy goals

- **Refine the current cross-border strategy to better complement and engage the constituent regions and cities.** The areas of industrial and technological specialisation where the TTR-ELAt stakeholders hold specific competitive advantages have already been identified. The process of smart specialisation among the constituent regions, promoted by the European Commission to access the next round of Structural Funds, provides considerable material to develop the cross-border area. The main challenge is to ensure that the TTR-ELAt action plan materialises, which requires efforts by the constituent regions individually and collectively. Several of the horizontal work areas identified have yet to be implemented (such as with respect to skills and entrepreneurship, for example) or have met with notable difficulties (branding/marketing and institutional development). Other actions would benefit from being included in the cross-border strategy, such as those of cities that often play a leading role in their innovation campuses, albeit such campuses are not yet connected with each other. To be effective, such a strategy needs to be accompanied by quantified, realistic and precise targets, which are monitored and considered in regular evaluation or feedback exercises aiming at identifying successes and failures, as well as new opportunities for cross-border work.

- **Encourage national or regional innovation policy instruments (the level depending on the country) to "mainstream" cross-border activities for diversification and sustainability of funding sources.** Mainstreaming has the highest potential for public action to support the TTR-ELAt's efforts. The Dutch Ministry of Economic Affairs is testing this effort through the GCS project, with a generous financial contribution to use this programme as an example for future collaboration, a financing approach that does not seek to ensure proportionate spending. Those initiatives that have proven effective can be integrated into the mainstream policies, in some cases building on experiments from EU-funded cross-border programmes. In addition to considering the value of allowing public funds on one side of the border to finance an actor on the other side, creative solutions to tap into various national funding sources (e.g. by establishing formal light structures on different sides of the border, aligning instruments across the border) need to be further explored, drawing lessons from initiatives such as the Holst Centre.

- **Refine the policy mix according to strategic goals and lessons from the past, building in a maximum of flexibility.** Existing programmes and initiatives provide strong building blocks for the TTR-ELAt action plan, and future publicly funded programmes would need to be based on lessons learnt from them. Building on past lessons can take several forms, such as extending successful cross-border initiatives from one sector or area to another. Another lesson is to identify upfront if project participants would be in a position to continue funding upon completion of the initial phase of the publicly funded or co-funded project. Another focus could be on filling gaps that the other bilateral initiatives are not addressing, particularly those with a strong public good aspect for the cross-border area as a whole. Another approach is to better integrate different existing instruments.

- **Adapt, where possible, EU policy instruments under Territorial Co-operation, including Interreg, to support the new realities of this knowledge-based cross-border economy through more strategic, rather than stand-alone, projects.** The place-based approach should be replaced by an innovation-based approach, where proximity plays a key role but is not translated into fixed artificial territorial boundaries. Management practices also result in a fragmented set of short-term projects that do not necessarily add up to greater overall impact. The Euregio Meuse-Rhine could therefore focus on more strategic and aligned projects for use of

innovation funding, to go beyond these stand-alone projects. EU sources dedicated to Territorial Co-operation should still be used as facilitators for experimentation, but can be re-oriented for more strategic use in the economic development of the cross-border area. Finally, mainstreaming is also an opportunity in other Cohesion Policy instruments, not only national and regional innovation policy, as sources beyond Interreg could be used for cross-border work that fulfils regional development goals.

- **Use the border as a test bed for innovation in relevant technological sectors (i.e. energy grids, ICT solutions, etc.).** There are examples of ongoing research experiments that consider the border as an opportunity for innovation. The cross-border area may result in a "living lab" to test and develop technological products that function on a cross-border basis. An example is the ongoing research on how to connect international energy systems, by researching and testing the case of Aachen and Heerlen (located very close to each other, but in two different countries: Germany and the Netherlands).

NOTES

1. In principle, a seventh region, Central Lower Rhine (*Mittlerer Niederrhein*) as represented by the NUTS 2 region Düsseldorf (NUTS 3 15 to 19 in Figure 1.1), is also part of the TTR-ELAt benchmark study but is not actively involved in co-operation efforts yet.

2. Definition of the BAK Technological Competitiveness Index: equally weighted index of nominal gross value added share of technology sector (1996-2006), real GVA growth (1996-2006), average number of patents (2000-04) and average number of publications (2000-06).

3. Although adjacent areas are entitled to a maximum of 20% of the total budget, only 5% of the funds have been allocated to project partners from Leuven Arrondissement and the Eindhoven region in the current programme.

REFERENCES

Ajmone Marsan, G. and K. Maguire (2011), "Categorisation of OECD regions using innovation-related variables", *OECD Regional Development Working Papers*, No. 2011/03, OECD Publishing, http://dx.doi.org/10.1787/5kg8bf42qv7k-en.

BAK Basel Economics (2008), *Top Technology Region: Benchmarking Report 2008*, BAK Basel Economics, Basel, Switzerland.

European Commission (2012), *Regional Innovation Scoreboard*, European Union, Brussels.

Halme, K., S. Kanninen, K. Viljamaa, E. Arnold, T. Åström and T. Jansson (2008), "Creating cross-border competence: Impact evaluation of the Wood Material Science and Engineering Research Programme", *Tekes Programme Report*, n°2.

InterTradeIreland (2013), "Ireland/NI background report for OECD study on cross-border regional innovation policies".

InterTradeIreland (2011), *Agri-Food: A Study for Cross-Border Co-Operation*, InterTradeIreland, May.

Möller, K. (2010), "Ex-post evaluation of the Interreg III Community initiative funded by the ERDF: Evaluation of the Interreg IIIA Oresund (Denmark/Sweden)", report to the European Commission, Brussels.

Nauwelaers, C., K. Maguire and G. Ajmone Marsan (2013), "The case of Ireland-Northern Ireland (United Kingdom) – Regions and Innovation: Collaborating Across Borders", OECD Regional Development Working Papers, No. 2013/20, OECD Publishing, Paris, http://dx.doi.org/10.1787/10.1787/5k3xv0llxhmr-en.

OECD (2013a), *OECD Regional Statistics* (database), http://dx.doi.org/10.1787/region-data-en.

OECD (2013b), *Examens de l'OCDE sur l'innovation régionale: Wallonie, Belgique 2012*, OECD Publishing, http://dx.doi.org/10.1787/9789264179523-fr.

OECD (2012), "Local scenarios of demographic change: Policies and strategies for sustainable development, skills and employment: Summary of Limburg seminar", OECD, Paris.

OECD (2011), *Regions and Innovation Policy*, OECD Publishing, http://dx.doi.org/10.1787/9789264097803-en.

Technopolis (2012a), "Regional innovation monitor: Regional innovation report: Flanders", report to the European Commission, Brussels.

Technopolis (2012b), "Regional innovation monitor: Regional innovation report Noord Brabant", report to the European Commission, Brussels.

TTR-ELAt (2013), "TTR-ELAt background report to the OECD study on cross-border regional innovation policies", March.