CHAPTER 13

EAST NETHERLANDS AS AN INNOVATION REGION

Can a Triangle between Valleys compensate for low critical mass?

PETER TINDEMANS

Global Knowledge Strategies & Partnerships, The Hague, The Netherlands

INTRODUCTION

The past few years have seen a resurgence of interest in regions for the performance of Europe with respect to growth and innovation. Since a couple of years the European Commission publishes data on the innovation performance of regions. Though some caution is warranted in using these data, for example since existing administrative demarcations, which are vastly different between countries, have to be used to define regions, they clearly show that examples of strong regional performance demonstrating unique specializations exist throughout Europe, including Central and Eastern European countries (e.g. Hollanders 2006).

Several countries are following suit by incorporating the promotion of such regional strongholds in their innovation policies. Finland is a good example: the country as a whole demonstrates that European countries can rank as any country in world-wide comparisons, but it also boasts several strong innovative regions. At the European level an important strand of the debate has to do with the use of the Structural Funds. Structural Funds have been part of the fabric of the EU since essentially the expansion to the EU-12, i.e. when huge GDP differences had to be taken into account and 'cohesion' became one of the building blocks of the EU. The Sapir Report (2003) underlined that using these Structural Funds to reduce income differences has significantly impeded growth in Europe. Instead of focusing European policies on exploiting the growth potential within Europe, the focus was blurred by 'me too' and 'national averaging out'. This has happened notwithstanding the fact that regional economic data illustrate that the European economy consists of several core–periphery systems, the cores of which continue to attract people,

W. Hulsink and H. Dons (eds.), Pathways to High-tech Valleys and Research Triangles: Innovative Entrepreneurship, Knowledge Transfer and Cluster Formation in Europe and the United States, 277-294.

investments and companies (e.g. Brakman et al. 2004). Of course, the system of 'cores' is not entirely stable; there are always opportunities for new cores to develop. One has seen this happening with Grenoble or with Barcelona and the Basque country. It is not easy, though, to resist the tendencies towards levelling out: most likely, the avowed aims of focusing on innovation will not greatly change the practice of the EU Structural Funds for 2007-2013, and at a national level it is often as difficult to concentrate resources on regions that have the highest potential to contribute to growth of the national economy.

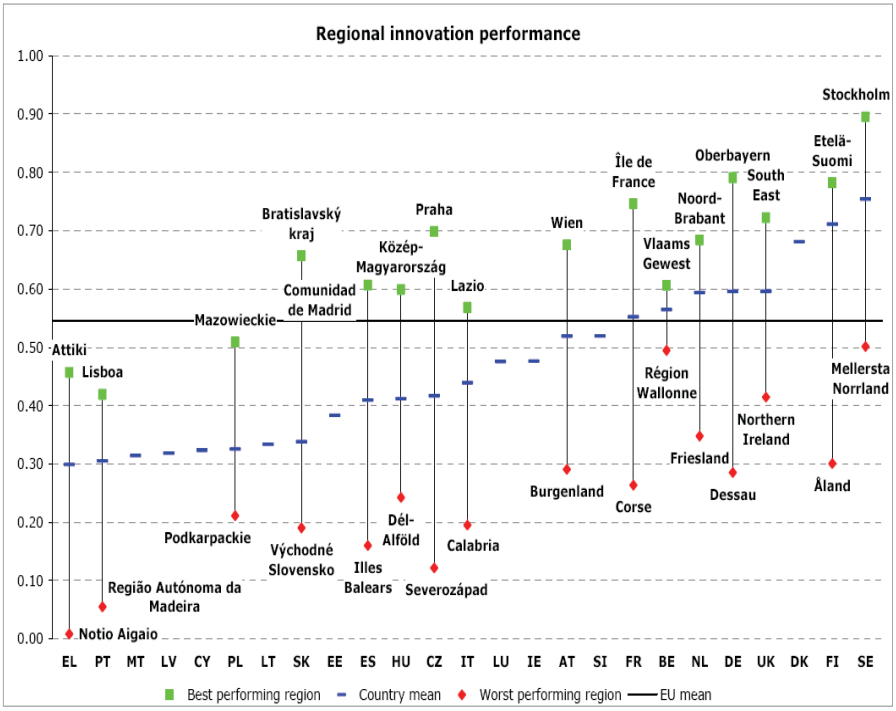

Figure 1. *Regional innovation performance*

The new Netherlands policy, adopted in 2004, to harness the economic potential of its various regions by supporting professional education, technology transfer, entrepreneurship and knowledge networks, illustrates the problem (Ministry of Economic Affairs 2004). An important reason is the tendency to identify each of these regions as innovation hot spots in which economic growth is driven by knowledge as this is the new paradigm of policy makers. This paper argues that more differentiation is necessary and that the conditions for genuine innovation hot spots need to be analysed better. We will concentrate on East Netherlands (EN), but make some remarks on Southeast Netherlands as well. East Netherlands is defined as the two provinces of Gelderland and Overijssel, but it should be noted that the

concept EN derives part of its prominence to political lobbying of the two provincial governments. The result is that the region has been described in the government White Paper as having all the hallmarks of a strong innovative region as well as a broadly carried innovation strategy. In addition to three universities, it is stated to have a relatively high level of R&D-intensive industrial activity (metallurgical industries, electronics and food) and also functional economic cohesion. The challenges facing the region are supposedly to find ways to use the available knowledge infrastructure and to reinforce the region's international connections.

The strategy adopted by the Steering Committee Triangle EN, set up by the provincial governments, positions the region as a Triangle consisting of three distinct 'Valleys', local concentrations of knowledge, or innovative networks each featuring a university: Food Valley at Wageningen; Health Valley at Nijmegen and Arnhem; and Technology Valley at the Twente region (Triangle Directing Group 2004). The linking pin was considered to be making a contribution to people's long-term health, exemplified in the unifying motto of 'Healthy People'. To that effect, four themes had been identified: innovation in healthy food and food safety; biomedical technology in and around the human body; technology in health care; and sports, exercise and health. This is the basis for the ambition to be 'among the 5 best performing regions in the world'. The chapter is the result of a request of the provincial and national governments to verify and, if necessary, further specify the concept for East Netherlands as an innovative region.

ANALYSING CONDITIONS AND ACTORS RATHER THAN USING INDICATORS

Regions throughout the world justifiably feel the need to emphasize regional strengths. This has resulted in the creation of a variety of indicators, sometimes summarized in innovation indices, to measure a region's relative strength. They are less useful if they hide great economic, geographical or cultural disparities existing within the region, which is in our view the case for East Netherlands.

Neither can they replace a systematic investigation of a region's potential by examining first of all whether conditions, for the time being loosely identified as specific mass (or concentration) and coherence, exist to position a particular region as a knowledge region. Secondly, companies, knowledge institutes and governments, as well as financial institutions, must have a shared ambition and a clear concept to collaborate to push their particular region. As a consequence we suggest that a region carries out a thorough analysis of at least five aspects.

Actors: Are the key companies, universities and research institutes, i.e. the key private and public actors in the 'knowledge business', convinced of the added value of the concept of 'East Netherlands' in the context of their own strategy and are they committed to make the realization of 'East Netherlands' a priority within their own strategy? Have local and regional governments the same conviction?

Potential and image: How do the potential and characteristics of the individual Valleys relate to those of the region as a whole, is 'Healthy People' the right theme to distinguish the region, recognized as such by the major knowledge actors?

Actions: Is it possible to identify strategic cooperative actions of universities, companies and research centres to significantly strengthen competences within the region and infrastructural facilities for innovation, and how can government at various levels (regional, national, EU) support these?

Organization: Is the organizational model chosen, a Steering Committee Triangle EN and separate Boards for each of the three Valleys, a suitable one?

International connections: What is the experience with and scope for systematically involving actors from the neighbouring region in Germany to strengthen overall innovative performance and what is to be expected from existing EU instruments such as the Euregions or the Interreg programmes?

INNOVATIVE REGIONS AND CLUSTERS

The physical proximity of strong public knowledge institutions (universities and others) and knowledge-oriented companies in an attractive innovation-minded region can be a flywheel for generating business, growth and social innovation. For analysing the potential of a region we need to understand better the distinction between region, which is a geographical term only, and the concept of cluster. It is true that Porter (1990) defines clusters also as geographical concentrations, but this is not always necessary; he describes clusters as "geographic concentrations of interconnected companies, specialised suppliers, service providers, firms in related industries, and associated institutions (for example universities, standards agencies, and trade organisations) in particular fields that compete but also cooperate".

Crucial in this respect are the terms 'coherent' and 'concentration'. The point is that these two terms are not entirely independent: when the coherence among core players in a cluster is very strong geographic concentration becomes less decisive. Two well-known Dutch examples of this are the aerospace and the maritime clusters, in each of which a major knowledge player in East Netherlands, the Thales defence industry company and the maritime research centre MARIN, play a key role.

One must therefore determine where the natural partners of companies and universities or research centres are located, which may be outside the region and increasingly even outside the country. However, if clusters are geographically concentrated, they usually have as it were a high density: many smaller and larger companies, universities and research centres in a limited area. Silicon Valley covers considerably less than half of the area of East Netherlands. Île de France, Grenoble or Cambridge (UK) are even a lot smaller. One should realize as well that innovative clusters often do not coincide with distinct administrative units, and the strength of an administrative region may therefore only become apparent at a smaller scale, or it may rather extend beyond the region, as will be illustrated by a cross-border regional stronghold in Southeast Netherlands and the adjacent parts of Flanders, the Walloon region and North-Rhine Westphalia. Different strongly localized clusters may or may not have the potential for mutual coherence. Political desire for coherence cannot mask an absence of coherence if core activities of companies or universities do not overlap.

The conditions highly innovative regions or clusters have to meet are well-known. They can be summarized in four aspects. The first has to do with *competences*: a strong science base and a strong company base (spin-offs, strongly growing companies, preferably some larger ones). Those competences often focus at a few themes, which may reflect areas of technology, or societal needs. Secondly, a *culture of cooperation and entrepreneurship* needs to exist. Universities, research institutes and companies have to reward entrepreneurship, be outward-looking and supportive of collaborations to explore new opportunities. In the era of open innovation also strong companies can benefit from being a spider in the web of a knowledge chain of companies and knowledge institutes with linked competences. Thirdly, various formal and informal *facilities and conditions* must be in place to organize innovation and support business development, such as venture capital, mechanisms and places for meeting partners and exchanging information, mechanisms to systematically explore new ideas for potential innovations, science parks and high-quality business areas with incubators. Excellent accessibility is vital, and a critical mass of high-end employment and an attractive living climate are essential to attract top people. Finally, one cannot do without *unanimity in aspiration and implementation.* In particular governments need to provide an optimum climate and ensure that strong and focused organizing powers exist which involve actors at the national level.

One has also to take into account that without exception the universities, research institutes or medium-sized and large knowledge-intensive companies that form the nucleus of an innovative region operate at an international level, and are part of national, European and global networks. When they see the need to cooperate they require the highest quality. If they can find this in the region, so much the better, but they will go elsewhere if that is not the case. Several consequences arise for governments. Large knowledge institutions and companies and the dynamics they are part of, should be leading. The geography of innovative clusters and regions rarely fits administrative boundaries and usually not at all the competences and policy interventions of regional authorities. It also implies that governments should not attempt to allocate specific themes and competences to a specific region. They must follow the dynamics of markets and knowledge. It is not completely impossible for governments to play a pivotal and initiating role, but that requires a strong vision and very much money, as the example of Flanders in the 1980s shows, where maybe Europe's strongest public micro-electronics research centre IMEC and the strong interuniversity biotechnology cluster VIB have been established in the 1980s[1]. This example also serves to illustrate that regional innovation policies cannot be limited to knowledge dissemination, technology transfer and the like. Strong knowledge competences and infrastructural facilities for them to thrive will also need to be reinforced, which in most countries, as in the Netherlands, is a responsibility of the national government.

SYSTEMATICALLY ANALYSING THE STRONG POINTS OF EAST NETHERLANDS

East Netherlands comprises the two provinces of Gelderland and Overijssel. It covers more or less the area in the ellipse in the figure below. The Triangle and the three Valleys constituting the corner points of the Triangle are shown as well.

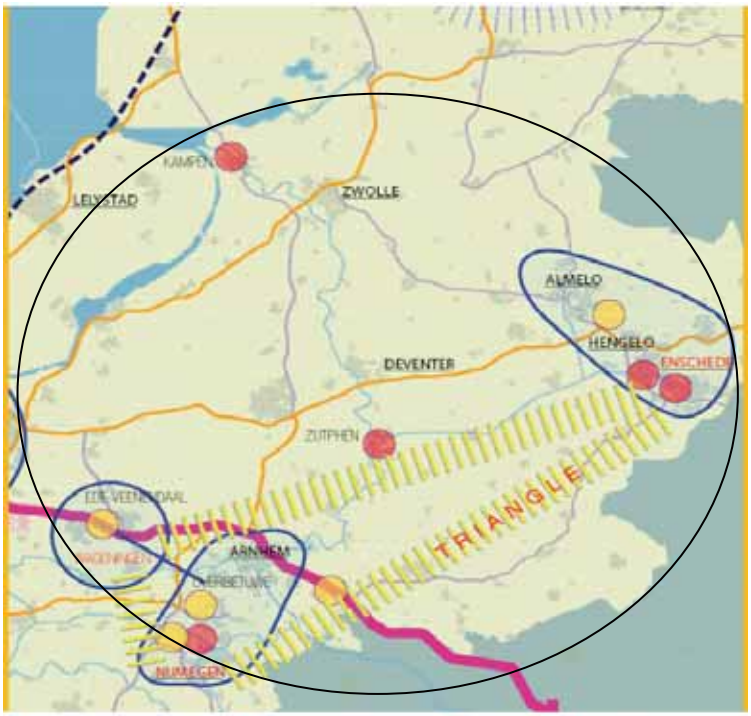

***Figure 2**. East Netherlands and the Triangle of three Valleys*

As can be seen, the Triangle covers only a very small part of East Netherlands, and in fact Technology Valley around Hengelo and Enschede is geographically and, as it turns out, culturally at quite some distance from the other two. The area in between and much of the remainder of the two provinces is rural and large parts are a national park. Boosting morale, creating perspectives and setting ambitious goals may be part and parcel of all successful policies, the geographical picture alone cautions: one must be realistic. The famous 'Lisbon' project of the European Union illustrates what can go wrong in terms of credibility when a political balloon is punctured by reality. For East Netherlands it is doubtful whether an official 'ambition' to be among the top five regions in the world by 2015 is sufficiently supported by a systematic analysis of the strong points of the region[2].

Innovative companies

Successful examples of innovation regions invariably show the crucial role that one or more high-quality universities play. But then companies, too, with a strong international position in their markets are important. As this may be the most difficult part of the challenge to be at the very front in 2015 it is a useful starting point for the analysis. The reference the reader should bear in mind, without going into detail here, are well-known innovative regions such as Southern Bavaria, Baden-Württemberg, Southeast England, Grenoble, or Silicon Valley in the US.

Several companies in the region, such as the defence company Thales, industrial textiles and materials company Ten Cate, or the previous Philips (now NXP) semi-conductor company at Nijmegen have large development departments. As their emphasis was in most cases on internal technology development and much less on research, they have always been more internally oriented compared to the large and well-known research laboratories of for example Philips or DSM, or within the region, in the past Akzo. Since it has sold its fibre division, AkzoNobel as a matter of fact is no longer a major knowledge player in the region. Plastics company WAVIN, high-tech systems company NEDAP and pacemaker manufacturer Vitatron are interested in research but operate on a smaller scale and were never in a position to drive an innovative region as a university or a big research-driven company can.

Siemens and Stork are focusing in the region on (albeit high-level) technological services, which means they can hardly play a role in the region. Important as a knowledge concentration in food science it may be, Wageningen has not yet attracted large industrial and knowledge-intensive companies with private research laboratories. A telling figure is that 45% of all industrial R&D in the Netherlands takes place in the North-Brabant and Limburg regions, whereas only 15% is carried out in East Netherlands, illustrating that the private 'knowledge density' of East Netherlands as a whole – but it is equally true for the three constituting Valleys – does not match that of the real regional powerhouses.

Companies do want to engage for example in building and reinforcing industrial clusters, together with stronger links to a university. But for them of course their own strategy is leading, and attempts to define umbrella-type themes for a region they hardly recognize would not fit with this.

Food Valley

Food Valley, i.e. the relatively small geographical area around Wageningen, including Zeist (in the province of Utrecht, but with a significant TNO branch focusing on food), is no doubt a strong anchor for a cluster of knowledge and business in the area of food and agribusiness. At the heart is Wageningen University and Research Centre (WUR), a merger of Wageningen University and the Dutch government's applied research laboratories in agriculture and animal husbandry. With 6700 employees WUR is one of the world's strongest agricultural universities, second to none in for example EU research grants. There are many others however, such as NIZO Food Research or the Wageningen Centre for Food Science, which is

one of the four leading technology institutes created as a long-term strategic partnership of WUR, two other universities and most of the Netherlands major food companies, and which is operating in a decentralized way. Since a couple of years the Food Valley Society has gathered these knowledge institutions, many companies active in the wider region and the local government. They have been a strong influence on boosting start-ups and business parks, networking between the various parties and breaking down barriers between local and regional governments and business. It is beginning to pay off also in the form of attracting larger companies with R&D activities to the area, which until recently was still not strongly developed.

At the same time 'Wageningen' is the heart of a Dutch Food and Nutrition Delta, a Dutch national cluster, based not only on Wageningen, but equally on the large international food and agribusiness companies with their R&D activities elsewhere.

The priorities and challenges 'Wageningen' and especially WUR faces are to a large extent determined by the need to keep this national Food and Nutrition Delta at the frontier of international competitiveness. Examples are the relatively small amount of R&D taking place in the food industry (1.5 - 2% of turnover) or an increasing need for pre-competitive cooperation as the spectrum of knowledge areas and competences that needs to be mastered is becoming ever broader, extending far beyond the scope of a traditional agricultural university into areas such as health, nanotechnology, process production industry and logistics, as well as design.

The challenge for Wageningen Food Valley Society is therefore very much to develop the anchor point 'Wageningen' as an integral part of the national strategy played out by the national Food and Nutrition Delta organization, since the global ambitions of the Netherlands are paramount; in Europe the competitors are France, with INRA and Montpellier, or the Øresund region. This poses natural constraints on the way 'Wageningen' can be positioned within a regional innovation policy. But from the policy point of view there is an advantage as theoretically at least the concepts and instruments of a national and a regional innovation policy, both implemented at the level of the national government, could be beneficially aligned.

Health Valley

The concept of Health Valley is based on the presence of a large academic hospital – nowadays called the university medical centre (UMC) St. Radboud, a large university whose medical faculty is integrated into the UMC but which boasts several health- and life-related strongholds such as the F.C. Donders Institute, which in a short time has developed into one of the top centres in Europe in the field of neuro-cognition, or the NICI in the area of cognition. Also in chemistry many relevant competences have come to the fore. Sint Maartenskliniek has a strong position in revalidation care, and the pacemaker manufacturer Vitatron as a medium-sized, high-technology and globally active company (now part of Medtronics) is representative of quite a few companies, most of them still small, that have been created, often as spin-offs from the university and the university medical centre. But the company base does not yet have a high density. Employment in health care is

more than the national average, and related to the attractiveness of the natural environment for providing health-care services.

A couple of years ago the Health Valley Platform has begun to bring together the relevant players such as smaller and larger companies, people from the university and the university's medical centre, and local authorities to develop the area focused at the cities of Nijmegen and Arnhem as anchor for innovative, knowledge-intensive activities in research, business, healthcare services and education. However, the developments are at an early stage, for example, merging two 'science parks' with a slightly different philosophy, namely Mercator and the University Business Centre, into a single centre for company premises and business development.

More fundamental challenges, however, must be considered, when branding the region exclusively as Health Care Valley. In the first place, the geographical boundaries may not be exactly right as the Nijmegen-Arnhem area will hardly be in the position to be the natural anchor point for health-care-related business activities, similar to Wageningen Food Valley for food-related business. True, many large research centres of Dutch food and agribusiness companies are not in Wageningen, but the concentration of competences there is such that it would be unimaginable to establish a joint centre for food science, WCFS, elsewhere. The major industrial players in medical technology and life sciences in the Netherlands, for instance Philips Medical Systems and Organon (soon to be part of Scherer-Plough), are located elsewhere and do not automatically look at Nijmegen when they need academic connections: they are in search of highest quality. The research and development activities of Philips Medical Systems thus far are concentrated above all in Aachen. Philips Research and Philips Medical Systems have recently entered into a strategic alliance with the Universities of Maastricht and Eindhoven in molecular imaging and molecular medicine more generally. The DSM chemical company has major ambitions with regard to biomedical materials. All this suggests establishing closer links with developments in Southeast Netherlands. Secondly, opportunities may be lost when not considering other areas than health care as well. The Radboud University is strong in different fields from just health and life sciences with the potential to commercialize knowledge and create companies and jobs. Its strategy in this regard is only gradually becoming explicit but is unlikely to be single-focus. In addition, major players like former Philips Semiconductors Nijmegen, now NXP, are not and can hardly be part of a regional innovation platform that focuses exclusively on health care. Indeed, combining Philips Nijmegen's plan for '52 Degrees' to concentrate on the one hand its own many employees in development, and to create on the other hand a meeting place with people from other companies (two-thirds of the space will be reserved for Philips, one-third is open) with the momentum created by the integration of the University's science park activities Mercator and the UBC into a single concept, offers decidedly opportunities[3]. The two together would produce an interesting potential for businesses throughout their early phases of development. They would offer, too, opportunities by organizing 'Innovation Labs' to generate systematically ideas on the basis of competences of knowledge institutions and companies, and explore in a structured way potential innovations emerging from these. It is not difficult to imagine numerous options between former Philips Semiconductors Nijmegen,

Vitatron, and the University in e.g. microsystems and nanotechnology. One could make things more attractive by adding a service-lab function: offering advanced analysis, characterizing, testing or, for example, metrology equipment, for which a basis exists at former Philips Semiconductors Nijmegen.

Technology Valley

Technology Valley is premised on Twente University of Technology in Enschede. It was the first university in the Netherlands to emphasize entrepreneurship and cooperation with especially smaller companies. Together with the Regional Development Corporation, OOM, it started a business park early on; it began cooperating on a large scale with companies in the region, and many companies have spun off from the University. Facilities for venture capital and business development have been set up and are constantly being improved, for instance in the new Knowledge Park and the TXCell, set up on the university's campus by Thales and the university to facilitate structured links between faculties, businesses and other parties, and another instance of the 'Innovation Labs' we came across before. The region has tried very hard and with significant initial success to develop an ICT cluster. But the coming and rapid disappearance of Ericsson when the ICT boom busted, is illustrative of the volatilities inherent in creating a new cluster in a region which has seen the loss of many high-quality heavy-industry and textile companies, and where the challenge to offer graduates an interesting and varied labour market and living environment is huge. Two companies are still there; the defence company Thales (previously rather unconnected to the University because of its defence ties) and Royal Ten Cate (equally unconnected because it used to be rather low-tech) are now willing to be much more active as regional engines of business development. Twente University has concentrated its research in a few major spearheads of considerable international quality and mass such as MESA+ (nanotechnology), the TCIT (ICT) and the Institute for Biomedical Technology, which is connected to the Roessingh Revalidation Centre. The Telematicacentrum, another leading technology institute, is also located in Enschede. The Twente Initiative for Medical Product Development (TIMP) is a small, multidisciplinary business cluster that promotes the competences of the companies and of the university. With the Dutch-German Internet Exchange NDIX and the ambitious developments in the area of wireless Internet, however, an advanced infrastructure became available for businesses, research and education centres, etc.

If one looks in greater detail, Technology Valley is different from the other two Valleys constituent of East Netherlands in that it is rather the sum of several potential business clusters, and the regional Innovation Platform Technology Valley is trying to assist in just this. One area concerns high-tech materials, where Royal Ten Cate can boost in cooperation with the university the establishment of a business cluster at the interface of material research and applications in health, sports and safety. The Genemuiden tapestry cluster and German textile companies, as well as Tejin Twaron, which houses the research and production activities of AkzoNobel in the field of twaron fibres, could strengthen such a cluster. Care and ICT, which should include biomedical technology, is a second potential cluster.

Construction is an option, and there is already a Foundation Mechatronics Valley. In all cases large companies and the universities have to take the lead in the formation of these clusters, though it is clear that it will be hard to create regional clusters for major institutes like MESA+, TCIT or the Telematics Institute. But that is a foregone conclusion anyhow, since leading industrial players and the university have to play a big role in other networks and clusters, for Thales it is the maritime cluster.

Logistical hub

Looking at the underlying economic, geographic and technological realities and dynamics at least two areas need to be given serious consideration. The first has to do with the geographical position of East Netherlands close to the supply routes of the Ruhr region and the southern, south-eastern and central part of Europe on the one hand, and the Berlin-Moscow axis on the other. The combination with a strong position in sectors such as food where logistic processing is a crucial element in the value chain, the presence of multi-modal transport facilities, in particular water transport, and the proximity of the largest inland river port in Europe, Duisburg, offers opportunities for value-added logistics.

Engineering consultancies

The second sector refers to the strong role of East Netherlands in the area of what we could call consultative engineering services in areas like space, the environment, water and energy. The region has a high concentration of engineering consultancies and technical service providers: companies like Arcadis, Tauw, KEMA, KIWA/GasTec, but also the former TNO-MEP (which is now partly a part of TNO-Quality of Life, partly of TNO-Construction and Foundation), etc. Perhaps, as earlier attempts by the province of Gelderland indicate, it is difficult to improve the location and living climate for companies and employees in this sector, but even that is worth the effort, because this is an extremely attractive region in terms of high-quality employment. And if it is difficult to build a knowledge network around these companies because their knowledge is in a way their product, rather than one of the elements that make up their product, they could at least be more involved in network activities. And perhaps the sector can increase its weight in the regional profile through large projects in the area of the environment, water and energy.

Interuniversity cooperation in East Netherlands

A final aspect to take into account in positioning East Netherlands as a single innovation region concerns the three universities in Nijmegen, Wageningen and Enschede. There is always scope for project-based cooperation between universities in a small country like the Netherlands. Another question is whether three universities that happen to be located in East Netherlands have reasons for considering each other as strategic partners. For several reasons this is not likely.

Radboud University looks for strengthening its technology competences primarily towards Eindhoven University of Technology. The local cultural differences between Nijmegen and Twente keep playing up even in a globalizing world. WUR has so far not decided that the broadening of its competences needs to come from Nijmegen and Twente University. The physical distance form Nijmegen to Twente University is rather big for having the latter university serve as an engine for new companies in the medical technology sector in the area around Nijmegen and Arnhem.

Opportunities from international extension?

East Netherlands borders on North-Rhine Westphalia and Niedersachsen in Germany, and it useful to investigate whether the potential of the region would be significantly strengthened by looking at a cross-border area with centres like Münster and Osnabrück; Duisburg and other places in the Ruhr region are already further away. If, however, the low density of knowledge institutions and companies is a problem for East Netherlands taken together, the situation will not improve by including the neighbouring regions, where there are few technologically advanced companies, and a few important universities focusing more on social sciences and humanities, all of them moreover at quite some distance across 'empty' space.

Twente and Radboud Universities do carry out a few joint activities with German universities in the region, but there is no indication of a systematic and natural synergetic exploration of opportunities to collaborate. Opportunities exist at a smaller scale, as two examples in developing clusters demonstrate: Ten Cate sees opportunities to link up with German textile companies in an emerging materials cluster; the above-mentioned cluster Twente Initiative for Medical Product Development is another one.

It is regrettable that not much support is to be expected from EU programmes. The Euregions and the associated Interreg programmes thus far offer little by way of promise; many political consultations are the result, as well as an abundance of small-scale projects across a very wide range. But the programmes are hardly used to reinforce systematically the innovative competences of neighbouring trans-border regions. They have to serve too many clients who all have their political patrons in each of the constituent sub-regions. The new regional policy underlying the EU Structural Funds 2007-2013 looked more promising as the intention is to focus the Funds for Regional Development (EFRO) on innovation and competitiveness. But attempts of the Netherlands government – the Netherlands getting support from the Structural Funds in itself is indicative of major flaws of the programme – to allocate its share more in line with the emphasis on innovation strengths were not supported by the Commission. The 7th Framework Programme 'Regions of Knowledge' action to bring regional parties together to define joint research agendas and develop instruments to implement those agendas, and which also provides for 'mentoring' of weaker regions by stronger ones, suffers from a common European disease, namely preparing for the action rather than carrying it out. In this case the research agendas rather than the research itself are supported.

HIGH DENSITY AND INTERNATIONAL, BUT UNTAPPED: THREE-COUNTRY REGION MEUSE-RHINE

To illustrate the additional potential of a region that benefits from a high density of private firms and public institutions active in research one may look at the Southeast Netherlands plus adjacent parts of North-Rhine Westphalia in Germany and Flanders and the Walloon region in Belgium. As a matter of fact there are not very many cross-border regions in Europe in the same category, mainly because they are often not densely populated. The Øresund region, the Vienna, Bratislava, Budapest region and the Strasbourg, Basel, Freiburg region are about the only ones. Figure 3 provides an indication of the geographical situation by mentioning several cities and the distance between them. It also lists the most important private and public parties: apart from universities and branches of public research organizations such as the Dutch TNO, the German Fraunhofer Gesellschaft or the Flemish VITO, or the largest (4500 fte) German research centre FZ Jülich, one finds many company labs, Philips, ASML, Océ, DSM or Janssen Pharmaceuticals.

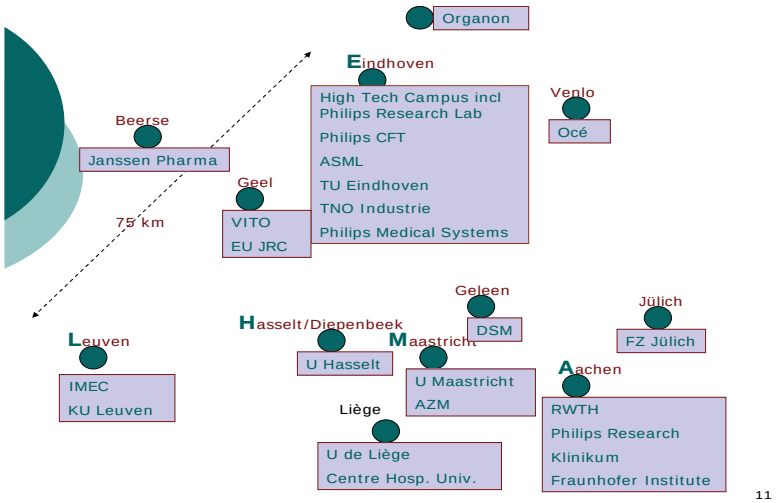

***Figure 3**. Three-Country Region Meuse-Rhine*

The potential is especially high in areas such as high-tech systems manufacturing, (bio)medical technology and life sciences, chemistry and materials, and automotive. Two examples may convey the flavour. In the automotive sector one finds several car assembly plants which together with other companies and research institutes cover the complete chain from design to assembly. In all three countries strong R&D capabilities exist as a consequence of which it has been decided in principle to establish a joint Centre of Expertise for the Automotive Sector with complementary branches in Aachen, Eindhoven, Liège and Lommel. Figure 4 in a very simple way shows that if one is able to erase effectively country

borders a large concentration can be found of older and new companies and research establishments in the life sciences and (bio)medical technologies. It is an international region spanning 3 countries, 5 cultures and 3 languages, which offers a huge potential for things as diverse as clinical trials and the creative industry. The region is a cultural and historical stronghold, and a combination of metropolitan potential and rural area with omnipresent nature and culture. Population density is high and it is close to even larger European population concentrations. To these and destinations further away it has very good connections because it is also a major logistical hub.

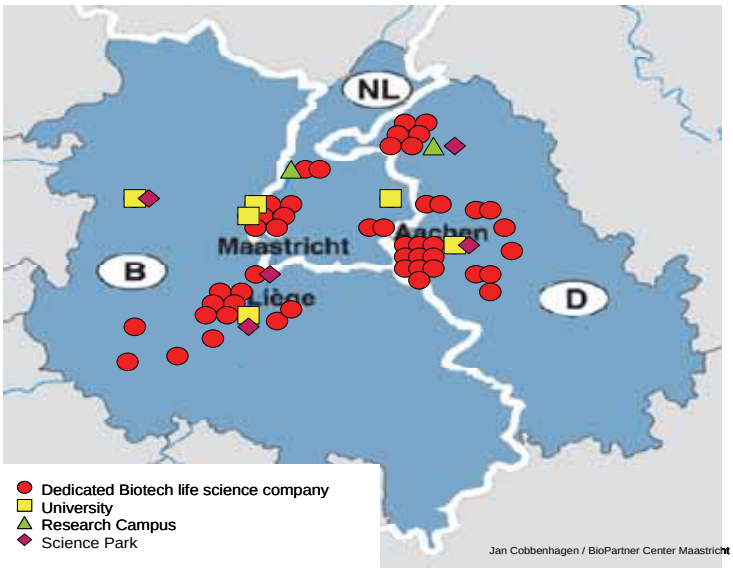

Figure 4. *(Bio)medical and life-sciences activity in a borderless region*

Much of this potential is still untapped. Companies, universities and research centres did not interact sufficiently within countries, let alone across borders. But important steps forward have been made with the establishment of several venture-capital companies and science and business parks. In particular the High-Tech Campus Eindhoven and the DSM Campus Sittard-Geleen, which are based on the principles of open innovation, may be important magnets to attract new private and public partners. A major initiative in molecular medicine between Philips, Organon and the universities of Eindhoven and Maastricht, which may soon incorporate the technological university of Aachen and the Jülich Research Centre, has been mentioned in the previous section. Organizationally, however, much needs to be done. As for East Netherlands it is vital that the key private companies and public knowledge institutions are in the driver's seat. The problem of doing so and to line up with the various government actors is of course compounded by the need to organize parties with very different competences and equally different political and

administrative cultures. One key lesson to be learnt from case studies like this is, however, that political boundaries do not fit the logic of the 'knowledge economy'.

Regional, national and EU authorities have to develop much more flexible instruments to tailor their support effectively to the needs of the regions where significant parts of the growth and innovation potential of Europe have to be realized.

EFFECTIVE CONTINENTAL–NATIONAL–REGIONAL POLICY MIXES

The delineation of political competences and responsibilities between the European, national and regional levels is in fact an issue of great significance as the challenges of a pervasive globalization require fast, flexible and effective policy responses. Re-designing Europe from scratch is neither necessary nor viable, but in the area of science, technology and innovation several drawbacks stand in the way of effective policies. For a comparison one may look at the USA, California and Silicon Valley. California is a big state; its population counts 36 million, and its annual state budget is 170 billion US $. Like European countries it has considerable powers in areas that are important for the promotion of innovation such as tax instruments, regulations (the example of environmental regulations is well-known) and (higher) education.

Silicon Valley is small: 2.5 million inhabitants, and a surface area of one-tenth of the Netherlands. It is not a single administrative unit, and therefore no administrative power of its own. It would be wrong, however, to equate California simply with a country and Silicon Valley with a region. One basic reason is that the role of the federal US government in the areas of research and innovation is very different from the view that is prevalent in many European countries and EU Commission circles. Whereas the EU Framework Programme for research and development is largely thought of in terms of application-oriented activities often requiring the collaboration of public research groups and companies, and basic, academic or frontier research (the latter being the new term embraced by policy makers in the context of the one positive but very recent exception, namely the newly established European Research Council)) was – and still is – not mentioned in the EU Treaty, the situation in the USA is virtually the opposite. Of all university research at American universities 60% is funded by the federal government, to a very large extent by five funding agencies: the National Science Foundation, the National Institutes of Health, the Department of Energy, the Department of Defense and the National Air and Space Administration[4].

Incidentally, only 6 to 7 % comes in the form of industry contracts, less than in Europe. And when it comes to applied research and innovation, the federal government takes a very active stand in developing new technological approaches for large societal missions such as energy, but it leaves the funding and otherwise stimulation of the whole gamut of small-scale projects as commonly found in the EU FP programmes to others. There is only one very successful exception: the Small Business Innovation Research and Technology Transfer Program (SBIR/SBTT) which challenges small firms (only firms with less than 500 employees are entitled to compete) to develop innovations targeting technological priorities specified by

federal agencies as crucial for meeting societal needs. But it is a far cry from the convoluted and indirect ways SMEs are targeted in the various EU programmes.

As a consequence one finds that a state like California has a rather straightforward policy on R&D and innovation. It funds education, including education at the public universities. It uses tax policy, for example as incentives for so-called angel investment, i.e. investments in the very early stages of commercializing ideas. It uses regulatory means. But it is very selective in funding R&D: it does so almost exclusively at and through the public University of California, and it focuses largely on institutional investments in priority areas, good examples being the Helios project at Berkeley Livermore for carbon-neutral energy or the four California Institutes for Science and Innovation at four campuses of the University of California. This combination of being selective, supporting a limited number of institutions based on a diligent use of competences and the availability of money and further strengthened by federal R&D investments that work along the same lines of selectivity and excellence, provides the fertile soil for regional initiatives. In Silicon Valley this takes the form not of trying to create a new policy layer, but of a 'community'-type of organization. The 'Joint Venture: Silicon Valley Network' brings together companies, banks, law and accountancy firms, schools, hospitals, local government, universities, museums and many others. The goal is to keep Silicon Valley the thriving place it is by identifying challenges in a great many areas, from education, health care, business conditions, crime reduction to housing and recreation, and subsequently and translating them as actions for the stakeholders themselves or for lobbying at the state level.

The much more natural way continental, national and regional responsibilities have evolved and are cooperating in the USA should serve as an inspiration for the effective promotion of European regional innovation strongholds. Major changes are needed in the design of the European R&D programmes, but there is no need for national governments to wait with being selective as regards themes and regions, focusing on the creation of strong universities or research institutes that are open towards and attract companies to the particular region, and working less through small-scale projects and all sorts of intermediary bodies to promote innovation.

CONCLUSION

The contrast between the Three-Country Region Meuse-Rhine and East Netherlands demonstrates how difficult it is to position a region as an innovation stronghold if that region as a whole suffers from what we have called a lack of density, loosely stated too few large and small private companies and public knowledge players per square kilometre. A region like East Netherlands has to analyse its various potential strong points and use them as points of departure. The three Valleys turn out to be quite different in nature and potential, and while eventually synergies may exist, these should develop bottom-up, as the whole process of developing innovation clusters or regions must be strongly led by the key knowledge actors, with governments in a supportive role. The latest version of the regional Innovation Agenda for East Netherlands of 2005/2006 goes in this direction

(Programmacommissie Oost-Nederland 2006). National governments have to realize that the potential as well as the way to realize this potential are widely different from one region to another. That requires flexible policies and instruments. The example of the USA, California and Silicon Valley illustrates focal points for such policies. 'One size fits all' will not do. In a Europe where the diversity has increased tremendously over the past 15 years, that lesson is vital too. Catching up, i.e. achieving a more homogeneous income distribution across countries, is important. But it should not be equated with making all countries, let alone all regions, strongholds in ICT, life sciences and nanotechnology. Doing so will only lead to a repetition of what the Von Dohnyani Committee in a never officially published report of 2004 signalled for Germany: 1250 billion euros of support since 1989 from the former West to the former East Germany has led to 0% growth in the East and negative growth in the West.

NOTES

[1] The then chairman Gaston Geens of the Flemish regional government was the driving force: a major policy initiative of his government was called the Third Industrial Revolution in Flanders (DIRV). In 1983 some 2 billion BFr (45 M€ in 1983 currencies) available to Roger van Overstraeten to set up IMEC.

[2] The following policy documents and consultancy reports, published by the East-Netherlands authorities between 2004 and 2006, were used for the overview section of the chapter: Regiegroep Triangle (2004b; 2004a); Tindemans (2005); Boekholt (2005) and Papegaaij and De Heer (2005).

[3] The consequences of Philips selling its semiconductor business for '52 Degrees' are at this stage not clear.

[4] http://www.nsf.gov/statistics/showpub.cfm?TopID=8&SubID=1

REFERENCES

Boekholt, P., Deuten, J., Van Giessel, J.F., et al., 2005. *Oost-Nederland, een toptechnologische regio? 14 karakteristieken nader gemeten*. Technopolis, Amsterdam. [http://www.technopolis-group.com/downloads/reports/586_Hot_spot_oost_rapportage.pdf]

Brakman, S., Garretsen, H., Gorter, J., et al., 2004. *New economic geography, empirics, and regional policy: an exploratory expedition of their common ground*. CPB, The Hague. [http://www.cpb.nl/nl/activ/workshop/european_integration/pdf/neg.pdf]

Hollanders, H., 2006. *European Regional Innovation Scoreboard (RIS 2006)*. MERIT, Maastricht. [http://www.drrtmip.cict.fr/IMG/pdf/eis_2006_regional_innovation_scoreboard.pdf]

Ministry of Economic Affairs, 2004. *Peaks in the Delta (in Dutch)*. Ministry of Economic Affairs, Den Haag. [http://appz.ez.nl/publicaties/pdfs/04I21.pdf]

Papegaaij, P. and De Heer, R., 2005. *Innovatieagenda Oost-Nederland: spel zonder grenzen.* Regiegroep Oost-Nederland, Arnhem. [http://provincie.overijssel.nl/contents/pages/5467/innoboekjequotes.pdf]

Porter, M.E., 1990. *The competitive advantage of nations*. The Free Press, New York.

Programmacommissie Oost-Nederland, 2006. *Pieken in Oost-Nederland: werk maken van kennis.* Programmacommissie Oost-Nederland, Arnhem. [http://minez.nl/dsc?c=getobject&s=obj&objectid=143775&!dsname=EZInternet&isapidir=/gvisapi/]

Regiegroep Triangle, 2004a. *Uitvoering Triangle: van bouwtekening naar beweging (Kennisbeleid Oost-Nederland)*. Regiegroep Triangle, Arnhem.

Regiegroep Triangle, 2004b. *Visie Triangle: benutten en combineren van kennis en kansen in voeding, gezondheid en technologie (Kennisbeleid Oost-Nederland)*. Regiegroep Triangle, Arnhem.

Sapir, A., Buti, M., Nava, M., et al., 2003. *An agenda for a growing Europe: making the EU economic system deliver*. European Commission, Brussels. [http://www.euractiv.com/ndbtext/innovation/sapirreport.pdf]

Tindemans, P., 2005. *Oost-Nederland Innovatieregio: toets en toespitsing*. GKS&P, The Hague.
Triangle Directing Group, 2004. *Triangle: utilising and combining knowledge and opportunities in food, health and technology (Knowledge Policy Eastern Netherlands)*. Triangle Directing Group, Arnhem.