

**OECD Cluster Focus Workshop
'Do clusters matter in innovation policy'**

**2nd session : Cluster analysis and cluster policy for a high tech cluster. The example of
the ICT cluster**

Working paper

The ICT cluster in Flanders

**Jan Larosse (IWT) - jan.larosse@iwt.be
Patrick Slaets (Fabrimetal) - patrick.slaets@fabrimetal.be
Jan Wauters (IMEC) – jan.wauters@imec.be**

1. Introduction

1.1. Policy background

Flanders' contribution to the OECD workshop aims to be part of the actual cluster formation processes in the ICT sector in Flanders. After the cluster initiatives in the nineties supported by the former government, the new Flemish (regional) government is preparing a new decree on the organisation of structural support for cluster initiatives. The development of this study can contribute to the emergence of new cluster initiatives in a new policy perspective. IWT, FABIT and IMEC¹, who agreed to work together in this study, are the main intermediary organisations representing government, business and science in the Flemish ICT system. They consider this study as an opportunity to reflect on an analytical framework conducive for these new initiatives.

There has been a change in vocabulary over the eight or nine years in which 'cluster policy' has been on the political agenda. These changes reflect a change in the attitudes of the actors involved.

1. In the early nineties - after regionalisation of main economic powers in Belgium - 'cluster policy' was put in the forefront by Minister-president Luc Van den Brande (also in charge of Economic Affairs), inspired by Porter and by autonomous regional policies in this line of Québec or Catalonia, to support the setting-up of a new institutional framework for a regional economic policy. This broad ambition had to be narrowed down to a specific support mechanism for the promotion of economic and technological renewal (Policy Document of the Flemish Government of November 1994). 'Clusters' then needed a formal acknowledgement in this status. Up to now some 13 'clusters' are recognised through individual governmental decisions: a 'covenant' (bilateral agreement) between the government and the cluster organisation, allowing specific support to set-up infrastructure and perceive additional support in existing technology schemes.

These clusters are a heterogeneous mixture of different types of platform organisations: sometimes with a few hundred members, mostly of limited nature; some of them high-tech oriented (DSP), but most of them in traditional industries (furniture, electro-mechanics, plastics, steel plate). This heterogeneity is a reflection of the policy choice for a bottom-up approach towards cluster formation and avoids government failure in 'picking winners'. This approach created a kind of policy vacuum at a moment that actors in general were not ready to implement 'real' cluster dynamics. Most initiatives were emanations of sector organisations (sometimes straightforward lobbies). The impact of these initiatives on the emergence of lasting horizontal networks of knowledge creation and exchange is rather limited.

¹ IWT is the technology agency of the Flemish government; FABIT is the IT department of the largest employers' federation; IMEC is the interuniversity research centre on micro-electronics

2. In the second half of the nineties a new model came to the forefront. Changes in the Ministry of Economics and uncertainty about EU-approval of the support mechanism blocked further 'recognitions'. Minister-President Van den Brande further restricted his cluster approach to technology policy, for which he remained in charge directly. In 1996 the initiative to establish a 'Flanders Language Valley' in the region of Ieper was started by Lernhout&Hauspie, a world leader in speech technology. With a track record of important acquisitions and integration of newly acquired technologies, the management was well aware of the strategic importance to create the optimal conditions in which tacit knowledge can be exchanged. They decided to build a science park that would provide the necessary infrastructure to: systematically encourage mutual cross-fertilisation between L&H and its application developers through proximity, favour the creation of new ventures with the help of a venture capital fund specialised in speech technology; facilitate all enterprises to concentrate on core business with the support of a central service organisation; and most important, favour the education and training of new speech engineers and linguists. FLV choose to start from scratch in the rather peripheric region of Ieper because of this was where the founders of L&H had their roots and where they also raised their first venture capital among local small entrepreneurs. The idea was to create a dynamics similar to Silicon Valley in the region, which - notwithstanding the specialised nature of speech technology - aims at the creation of several thousands of new jobs. This initiative was developed as a public-private partnership, in which public authorities had from the start an active role in the improvement of necessary environmental conditions in education, research, infrastructure. From this experience the Flemish government derived a new policy model focussed on the role of 'technology valleys' to create new growth conditions. Several regions were identified to host such a 'valley'. Some of them in relation with European Structural Fund ('Flanders Graphic Valley' and 'Flanders Drive' are located in Objective Two zones). But the difficulties in identification of promising technologies and the rather artificial localisation of some proposed actors in geographically narrow valleys proved that a success model can't be copied too mechanically.

3. At this moment a third phase of cluster policy is in preparation. The Flemish government wants to provide a transparent regulation of support to 'innovation co-operation agreements'. The government is opposed to all sector specific support arrangements (and technology specific impulse programmes) but is aware of the strategic role of the strengthening of the knowledge base to anchor the existing industries and attract new ones. New initiatives may receive some structural support but will have to compete for funding within the existing support mechanisms. The institutional conditions to provide support to collective initiatives engaging business, science system and government has been laid down in the new Decree on Innovation of June 1999. The coming Governmental Decision on Flemish Innovation Co-operations has to establish correct incentive structures to promote fully the virtuous interaction among knowledge actors. Meanwhile the business environment has been changing dramatically, opening up old organisational structures of enterprises and enterprise federations to the new network economy. There has grown a genuine interest in the opportunities offered through co-operation at the local level between actors that share strategic interests.

1.2. Theoretical background

Cluster policy has to do with the exploitation of the public good nature of knowledge, in particular the externalities that are generated through proximity. The diffusion/exchange of tacit knowledge is conditioned by local circumstances because of the embeddedness of this human capital in specific organisational and cultural environment. This specificity is at the heart of the definition problem and also of the difficulties in drawing general guidelines about cluster policy.

Cluster policy is perspectivist, actor depending (because actor oriented).

A first aspect is that it aims at finding a common ground between the sourcing strategies of global enterprise and localisation policies of regional government, both interested in valorisation of local resources. Government has to fulfil a new responsibility in a knowledge economy as a facilitator of innovative interactions. The management of national/regional innovation systems must be aware of the importance of spillovers in creating cumulative knowledge creation, take advantage of increasing returns, exploit the collective productivity. One way is to encourage the production and internalisation

of these spillovers in cluster organisations. Government cannot be but a facilitator since the main actors are the enterprises.

Another aspect of cluster policy is that it is linked to the policy perspective of the actors involved. At the international policy level the specificity is to make new policy realities visible within a new descriptive framework, such as to promote a consensus on what policies are legitimate, how they can be successfully benchmarked. The OECD effort to develop new indicators for knowledge-flows (process indicators) and to promote the comparison of good practices, is of this nature. It is not easy to reconcile this efforts with the specific internal policy needs of national governments (not always aware of the bonus of generalising cluster policies or even eager to differentiate their own launching new denominations) and the activities within specific cluster platforms (that are most often exempt from the need to derive conceptual generalisations). The study of the cluster focus group should aim at bridging this distance. The agreed methodology is to combine a mega-cluster framework on the one hand (based primarily on input-output methodology) and a case study approach on the other hand (among these: the ICT cluster).

We should like to propose to pursue this dichotomy further **within** the case studies:

- First: find a common statistical framework to describe the commonalties and differences within the general cluster structure.

In this context 'cluster' may denote an interlinkage of 'objective' economic and technological nature between activities that produce and share spillovers. Note that these spillovers are function of the organisational specificity of the industrial structure (a higher degree of industrial integration causes less externalities; the virtualisation of enterprise generalises on the other hand the issue of spillover).

To start with a common statistical description of **industry (sub-)sectors on Nace level** offers a starting point to evaluate the quantitative importance of the whole of ICT in the economy and of its components. In the following we will use the definition as proposed by Dialogic. But this statistical approach is limited by the conventional content of sector definitions, which are not adequate to grasp the actual ICT reality. This explains why ICT is to be found 'everywhere' and borders are continuously shifting.

This general framework can be supplemented with another one - also general but immediately referring to existing business practices - on the composition of the **value chain**. Here we are confronted with the issue of strategic convergence. The value chain perspective is business driven and demands a certain convergence in opinion on how markets are developing. In its most essential components there might be no big differences in this description, but the specificity of local actors will be reflected in the indication of local strengths. The description of the Flemish ICT value chain is the product of a conceptual interaction between representatives of main ICT-players in Flanders.

- Second: analysing cases of cluster behaviour that are of strategic importance within the regional innovation system or have an exemplary role.

In this context 'cluster' denotes most often an explicit form of organisation that is rooted in a pre-existing cluster dynamics or that has been established precisely to generate this dynamics. An example of the last is **Flanders Language Valley** for which an extensive case study by R. Wintjens (Merit) - also available on the web-site - is added in annex.

Our present case is the operation of knowledge flows by the microelectronics institute IMEC. IMEC has a pivotal role in different cluster initiatives in the ICT-sector in Flanders. As a public research institute its mission is to industrialise its knowledge base in Flanders, but its growing dependence on external financing makes it also very sensitive to changes in co-operation strategies in industry and aware how to combine with these strategies. The aim of the following is to analyse how the generation and internalisation of different forms of knowledge spillovers is put into daily practice. Not only to contribute to a more efficient operation but also to provide more general insights that can be implemented in a different context. Combination of private, shared and public knowledge is key in the incentive mechanisms that govern the development of the IMEC cluster.

2. ICT-clusters in Flanders: A pragmatic approach to stimulate innovation cooperation

2.1 The Flemish ICT-sector

The ICT-sector in Flanders creates 200 billion BEF value added (5 billion euro or 4% of Flemish GDP). 60 000 collaborators are working in this sector. This is about 3% of total employment in Flanders. The Flemish ICT-sector is specialised in telecom equipment (Siemens, Alcatel), consumer electronics (Philips, Barco), IT-system integration & installation (IBM, Telindus), IT-services & software (EDS, Dolmen, Origin), speech and translation technology (Lernout & Hauspie Speech Products) and digital photography & printing systems (Agfa-Gevaert, Xeikon).

Most important is that the Flemish ICT-sector is responsible for more than one third of the total R&D-investments in this region. Furthermore, in the New Network Economy, ICT is more and more accepted as being an excellent enabling technology to (r)e-engineer business processes in enterprises and organizations of all sort. This means that a lot of (especially organizational) innovations in the Flemish industry is also focusing on ICT and on the development of it. In particular, we think of the automobile, mechanical and chemical industry and of the financial services & insurances and the transport & distribution services.

2.2 The Information & Communication Content Cluster

In the global economy, one can make the observation that the so-called content industry is integrating in the ICT-industry. The carrier of information is depending more and more on the information that is sent and vice versa. The most cited example in this field is of course the recent merger between Time Warner and America On Line. In Flanders there is the E-Corporation, a dot-com start-up that consults enterprises in doing e-business. This young company was founded by an incumbent in the telecom manufacturing and by an editing & printing company, and is now the largest player, specialised in the field of e-business-consulting.

The digitalisation of image, voice, data and sound is behind this rapid integration and the information and communication is becoming totally transparent and practically totally free that new business models are needed to survive. Speed, accuracy, selectivity and structure are becoming the principles that create value added.

In Flanders, this integration is also developing at an accelerating pace. The Flemish I & C content cluster is specialised in 5 fields. Editing & printing, broadcasting (radio and television), publicity & marketing agencies, photography and last but not least film & video.

In this content cluster, there are working about 35 000 people (This is about 2% of total Flemish employment). These collaborators are creating about 100 billion BEF value added (2,5 billion euro, 2% of Flemish GDP). It's reassuring to notice that the speech & translation technology on the one hand and the photopgraphy & printing technology on the other hand are supported by a content cluster that is able to adopt very fastly the newest technological evolutions in these fields.

2.3. Innovation in ICT and stimulated by ICT

Until recently, the ICT-sector has been working together in different R&D- and innovation projects in the framework of the so-called Technology Impulse Programmes on Information Technology. The large innovative players were developing new technology in the field of IT on their own, in small project groups or in partnerships with universities and research institutes.

Since the development of the so-called New Network Economy, more and more innovation cooperations became "virtual". The desintegration of the value chain (outsourcing, contract manufacturing, focusing on core activities) had the logical consequence that development of new products became a more complex proces.

Furthermore, the new game in business was coopetition. Work together with complementary partners to improve your products and add more functions to it. Compete with your competitors if needed and look for alliances if possible.

In this new business model, the formation of large multi-disciplinary platforms of innovative enterprises and organizations is a useful tool. And this new form of clustering (no more regional nor sectoral dimension) is becoming very important. The key role in this new approach is the human factor. Platforms are only useful if people are learning from each other and are being creative. A good example of the results that such a platform can create is given by the case of Eastman (developer of the film role) and Edison (inventor of the photo-camera). Both had an innovational problem and had found innovational opportunities. Both inventions were complementary and it was only after they had a personal contact that they brought together their inventions. In the New Economy, these sorts of innovations should be stimulated.

2.4. The new pragmatic approach

In a new platform called FIOS that has been founded at the end of 1999, innovators are brought together to reflect on these interesting themes. Fios stands for Fabit Innovation and R&D Committee. Fabit is the federation of ICT-firms.

A first task of this group was the design of the Flemish ICT-Value Creation Model. This model is a sort of up-to-date- "technology and business path" for the ICT-firms in Flanders and will indicate for the near future, where innovation cooperation could be very useful and necessary.

3. IMEC: a catalyst of industrial renewing

IMEC was established in 1984 by the Flemish Government to stimulate microelectronics technologies in the Flanders Region. Today, IMEC has become one of the largest independent research centres in the world in the field of information- and communication technologies (ICT), with a staff of nearly 1,000 and an annual budget of 90 million EURO in 2000.

Since its inception, IMEC's mission is to perform scientific research that runs 3 to 10 years ahead of industrial needs. As part of its strategy, IMEC co-operates very closely with world-leading companies and research centres all over the world.

The most important scientific activities are concentrated on the development of new process technologies for the next generation of integrated circuits (ICs), and on new design technologies for advanced electronic systems focused towards integrated information and communication systems (for telecommunications and multimedia applications).

The financial support of the Flemish Government allows IMEC to perform strategic, internal research and to build valuable background information, basic "know-how". Such background information constitutes an attractive basis for co-operation with industrial partners allowing them to optimise the cost and time-to-market of R&D projects.

Its strategic approach is directed towards reinforcing industrial activities in Flanders in ICT. IMEC's industrial policy can be visualised in 3 phases. In a first phase, starting from its inception, a technological portfolio was being set up, in order to become a renowned research centre with world-wide reputation. In a second phase, a world-wide network of world-leading industrial partners was

created, based on joint R&D projects. In a third phase, the technological portfolio and industrial network are fully exploited towards Flanders.

IMEC has always realised that knowledge creation is only one aspect of a long-term successful expansion of a regional high-tech industry. That is why, next to R&D, IMEC has chosen to educate and train experts in the field of microelectronics and more broadly, ICT. Today, more than 1,200 people are trained each year, in fields ranging from engineering courses on process technology and design techniques, to process operators, technicians and introductory courses for non-professionals such as managers, financial accountants, analysts, etc.

Next to knowledge creation and training, a number of other critical success factors have to be present in a region in order to build up a sustainable high-tech industry. These other factors include the presence of appropriate infrastructure such as science and business parks, entrepreneurship, venture capital and networking. Networking provides a powerful tool to sustain and improve innovative cooperations. In essence, IMEC has created a network of knowledge links connecting international players with Flemish industry.

IMEC is a program-driven research organization. This means that research programs are defined in accordance with technological and market trends that will dominate in the coming years. These decisions have to be tuned to the windows of opportunity for technology and its applications. Companies that participate in these research programs can have early access to new technology, methods and breakthroughs. In parallel to the R&D project, industrial partners can set up new production strategies at an early phase, giving them a significant competitive benefit. This results in a very dynamic interaction model between industry and research. On an international scale, IMEC has always sought to be a centre of excellence in a number of expertise domains. The international co-operation has generated a continuous flow of know-how and human capital in the region and has allowed for co-financing of sometimes very expensive R&D projects. The development of new production processes of ICs is very capital intensive and increasingly, R&D centres, IC manufacturers and suppliers combine forces in joint R&D teams.

On a regional basis, technological developments are transferred to the region in many ways. IMEC has generated a network with the different players in the region, i.e. industry, universities and polytechnical schools and with the community. Technology is being transferred to industry through a.o. licensing, creation of spin-off companies, consulting and training. In addition, the large annual turnover of IMEC personnel, between 15 and 20% each year, guarantees a continuous flow of highly-qualified people to local companies. Many research projects are carried out with all Flemish universities. Advanced design tools are made available to a network of polytechnical schools.

But IMEC realises that the success of a high-tech region is not only the creation and transfer of know-how and training the workforce. The information society is also a matter of perception, of acceptance of new technologies and interest from youth. In this sense, IMEC indirectly contributes to industrial activities on the long term by e.g. organising visionary workshops, summer schools and seminars to increase the awareness of science and technology.

Networking constitutes an essential element for the success of not only an R&D centre such as IMEC, but even so for the ICT industry in Flanders. IMEC is member of DSP Valley, an industrial cluster centred around digital signal processing (DSP), the key element of most communication devices. Today, DSP Valley groups no less than 1,100 experts in DSP, from universities, industry and R&D centres. Increasingly, co-operations are set up between DSP Valley, Flanders Language Valley and Flanders Multimedia Valley. The aim is to establish a virtual ICT park in Flanders, connected by state-of-the-art communication technologies.

4. First Conclusions

Cluster policy is about self-organisation: co-operatively organising the conditions favourable to exploit synergism and complementarity, in particular in knowledge creation and knowledge use.

Description and analysis of cluster dynamics are intertwined with the constitution of clusters and cluster organisations themselves. Cluster studies provide strategic knowledge to potential partners. If well conducted, the study process itself can stimulate networking and show participants new opportunities. The Flemish experience underlines more in particular the need to engage the actors themselves in 'self-description'. If not, cluster policy can be very much restricted by more traditional behavioural mechanisms of business-government interplay (vertical relations of purely financial transfers). To engage in new public-private initiatives that promote self-organisation, networking and relations in horizontal sense, a pragmatic approach is needed. This approach combines a basic understanding of the new network economy with 'bottom-up' experience and learning. Case studies are opportunities for the enhancement of self-organisation and for policy learning.

The materials that are gathered up to now in the study process will help to broaden the awareness of the advantages of networking and clustering on complementary resources. The ICT cluster in Flanders is a very dynamic part of the innovation system. The role of Imec as a leverage power in industrialising local and international knowledge in microelectronics for new business creation has reached now its maturity, after a decade of 'breeding' its international network. The ICT-actors in Flanders have experienced now fully the profound changes of industrial organisation imposed by the advancement of the new knowledge economy. They are the driving force to initiate new innovation platforms that can strengthen the interconnectiveness of the Flemish innovation system and the mobilisation of local resources to secure the future economic, social and ecological development of the region.