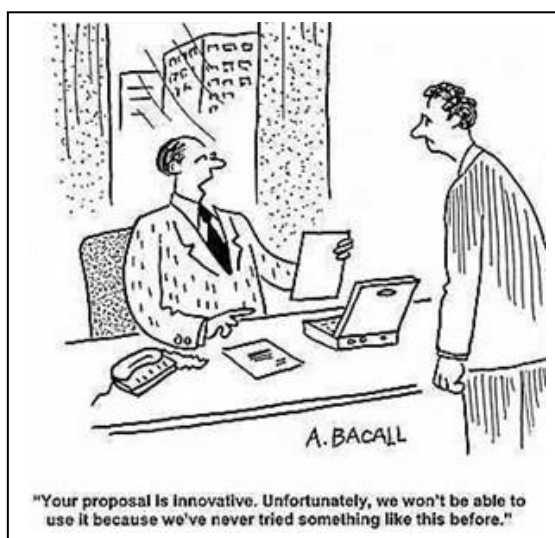


Open Innovation as a strategic model for economic stimulation



How to stimulate a company to innovate:

Summary:

How can we stimulate small and medium-sized enterprises to make more and better innovations, to be open to external developments and to work with others to achieve joint economically responsible and sustainable development?

How can we realise this stimulation effectively and efficiently, at a time when financial resources are becoming increasingly scarce and when international competition is on the increase?

Maastricht
October 2012

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1. Introduction

Innovation is a hot topic in the political world and is frequently mentioned in political programmes and policy documents. Innovation is viewed as one of the many ways of creating a strong and sustainable economy with plenty of jobs in an open global economy, hit by a serious crisis. In its EU 2020 strategy the EC proposes 3 priorities, one of them being intelligent growth to create a knowledge and innovation-based economy. The EU 2020 paper also proposes 7 core initiatives as a catalyst for the various priorities. The first priority is the "Innovation Union", to improve the preconditions for and the access to research and innovation funding, so innovative ideas are turned into products and services that pave the way for sustainable growth and jobs.

In 2009, the INTERREG IVA Project ChemClust is developed within the European Chemical Regional Network (ECRN). The Province of Limburg is an active partner in ECRN and is responsible for the Open Innovation pilot in ChemClust. It predicts that the end result will be that the other ChemClust and ECRN partners will need to be advised on how to reinforce Open Innovation within their in-house innovation structures.

LIOF has been asked to handle the activities surrounding this matter.

Remarks:

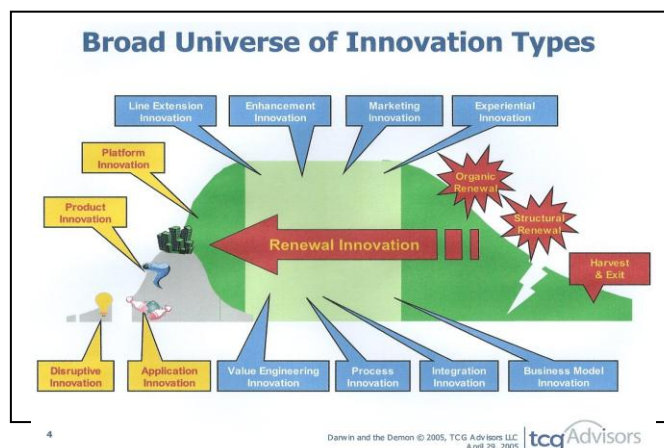
Innovation is a concept with many interpretations, including economic, organisational and social, in addition to technological ones. This concept is therefore often used in a political sense. What's more, the problem is that its effects are difficult to measure and can only be measured over the long term. Despite this fact, the idea that innovation is important enjoys widespread support. With respect to defining innovation, this report uses the following assumptions:

- innovation - technical - combined with economic results;
- market driven;
- related to small and medium-sized enterprises;
- state aid proof;
- efficient and effective.

The key-question is:
How to stimulate an entrepreneur to innovate
(more and better)

2. Innovation

Innovation is generally defined as the complete process of discovering something new and introducing it to the market. There are, however, many different types of innovation. One way to describe innovation is using the product life cycle (see figure below).



Source: Philip Lay 2005

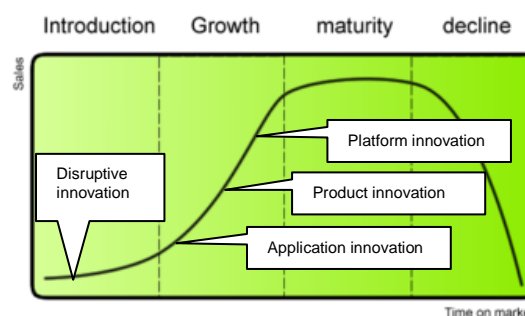
Some other types of innovations are:

- Incremental innovation : a marginal product or component adjustment;
- Supply chain innovation : innovation in purchasing semi-finished products or raw materials from the supplier and supplying finished and semi-finished products to consumers or purchasers;
- Technology-driven innovation : innovations initiated by new technological discoveries;
- Customer-driven innovation : innovations initiated by the customers, as well as users and consumers.

Innovation is stimulated by governments and the main reason for this is that they want to stimulate economic (and employment) growth, see: EU strategy 2020 (creating a strong and sustainable economy with plenty of jobs). Looking at the product's lifecycle it's clear that in the initial stages - the introduction and growth phases - new products and activities will be created, bringing additional turnover, added value and employment in the future. For these reasons especially innovation in these stages should be stimulated.

The types of innovation in these stages are:

- Disruptive innovation: breakthrough innovation;
- Platform innovation: practical application of knowledge;
- Product innovation: new products;
- Application innovation: range of products based on the same knowledge.



By stimulating these forms of innovation, the government directly contributes to growth and reduces development risks, meaning entrepreneurs are likely to innovate early on, and quicker innovation is equivalent to more innovation. By setting conditions, e.g. no incremental innovation, the entrepreneur can also be stimulated to start up better innovations.

Innovation in the two other phases of the product life cycle (stabilisation and decline) are important for stabilising the product options and prolongation of the lifecycle. For example: process innovation often leads to efficiency improvements and to lowering cost prices. This may only indirectly affect growth.

Government policy

Government are stimulating innovation because innovative companies create employment opportunities and economic prosperity. Innovative companies are companies that develop and sell new products and services.

Universities also innovate, but often this innovation is technology-driven. Universities are not innovative companies en the risk is that the market might not accept this technology or product/service (yet). To avoid this, universities must work together with innovative companies.

For scientific research, without direct market potential, specific R&D stimulation measures are available.

Revenue model

As specified, authorities stimulate innovations, whereby a distinction can be made between:

- boosting of innovation projects (creating project leads) and
- stimulating of concrete innovation projects.

Stimulating of innovation is often seen by authorities as a cost item. The revenue model is less transparent. The success indicators are mostly limited to the number of companies, the amount of subsidies and perhaps the realised innovation impulse (= total innovation efforts that companies generate). The economic impact generated is much more important, but is much more difficult to measure clearly.

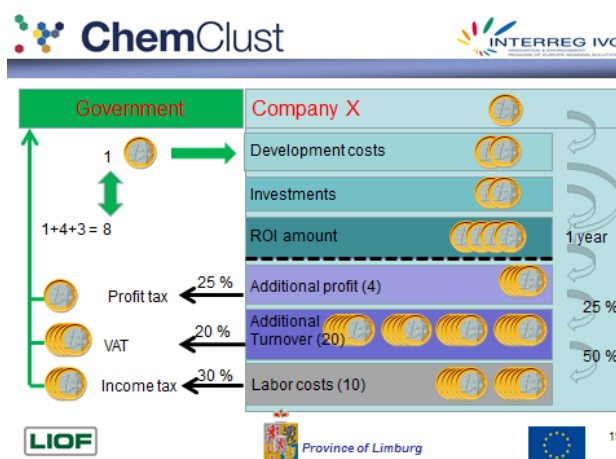
This is perhaps a reason why revolving loans are becoming popular. The entrepreneur (if successful?) must pay back the support that was given.

In the case of boosting innovation projects (no business case to define), a loan can hardly be realized: e.g. who will pay back?

Innovation, successful or otherwise, provides the government a powerful multiplier, under the condition that innovation is only stimulated at the start of the product life cycle. It is necessary that an application for financial support includes a full description of the business case. This business case not only gives information about the development budget, the scheduling, the investments required and the risk that will be run (market perspectives versus costs), but also insights into the benefits an entrepreneur will achieve with a successful innovation. These might be the IP position or the ROI (Return on Investment).

The simplified revenue model to the right assumes the following:

- The entrepreneur is given a subsidy of 50% for an innovative product development project that amounts to € 2,-;
- Before the product can be introduced to the market, an additional investment is needed of another € 2,-;
- The entrepreneur and experts estimate a ROI of 1 year.



The ROI assumes a return period of development product, these expenses are recouped from new profits.⁷ The new profits are created from the new turnover and require new staffing.

This additional profit, turnover and staffing provides the government with (in general⁸) corporation tax, VAT and income tax.⁹ Assuming percentages of 25%, 20% and 30% respectively, this € 1,- innovation subsidy will supply the government with € 8,- (approximately).

⁷ If an existing product needs replacing, i.e. there is replacement turnover and employment, it must be kept in mind that this turnover and/or employment opportunity will probably disappear in the future. If not, the ROI-determination should be included.

⁸ Often the distributing authorities are not the collecting authorities, so they will need to arrange a mutual calculation model.

The debate about revolving funds is interesting. If the stimulating effect of revolving funds is just as great as the effect of direct corporate subsidies, the revenue model could become even more profitable to the government. This could be comprehensively tested in practice.

State aid limitations

Promoting research, development and innovation (RD&I) is an important objective of

The terms and conditions for state aid determine the preconditions for innovation stimulation.

common European interest. European companies should invest more in research, development and innovation in order to be able to compete on a global scale. The European Commission emphasises the fact that competing markets should, in principle, independently provide the most practical results in the RD&I field. This will **not always** be the case, however, so governments - decentralised and otherwise - could benefit from taking support measures. State aid for RD&I is compatible with the common market. We can also expect that this support will lead to additional RD&I and that distorting the competition will not be contrary to the common interest.

Innovation is connected to a process whereby knowledge and technology are combined with taking advantage of opportunities on the market for new or better products, services and corporate processes in relation to that which is already available on the common market, but not without some form of risk. In brief, activities in the field of R&D include:

- fundamental research (experimental or theoretical research without any intended practical application of the knowledge gained);
- industrial research (oriented towards knowledge that can be used to develop new products or improve existing products);
- experimental development (using existing knowledge to develop new products and services).

"Fundamental research": experimental or theoretical activities that are performed chiefly to acquire new knowledge about the fundamental aspects of phenomena and observable facts, without having any intended direct practical application or use;

"Industrial research": systematic or critical research oriented towards gaining new knowledge and skills with a view to developing new products, processes or services, or to substantially improve existing products, processes or services. It includes the creation of complex system components needed for industrial research, in particular for general technology validation, with the exception of prototypes;

"Experimental development": acquiring, combining, designing and using existing scientific, technical, corporate and other relevant knowledge and skills for plans and diagrams or designing new, adjusted or improved products, processes or services.

Companies have been innovating for years, but innovation management has changed in time:

- 1950 – 1965 : technology push: companies work within their R&D parameters to create products, which are subsequently introduced to the market.
- 1965 – 1980 : market pull: the basis for innovation is the customer's requirements, which are met with the help of technology and science. The main result here was incremental innovations.
- 1980 – 1990 : a combination of market and technology pull: innovation has become an essential component of operational management

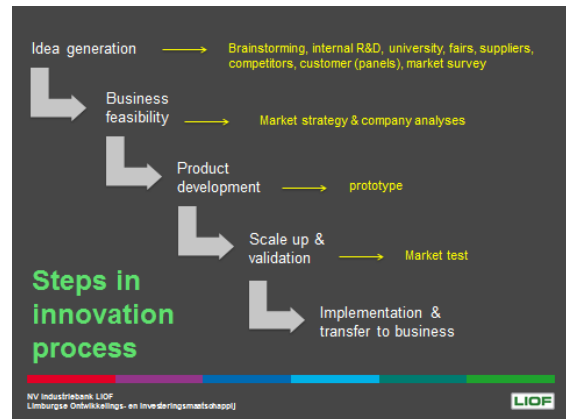
"Most innovations fail, and companies that don't innovate die." Chesbrough (2003)

- 1990 – now : Open Innovation: the innovation process must become more successful and is no longer a linear whole, but can also be composed of 'separate' pieces. There is a major cooperation and interaction between the internal R&D department and the outside world.

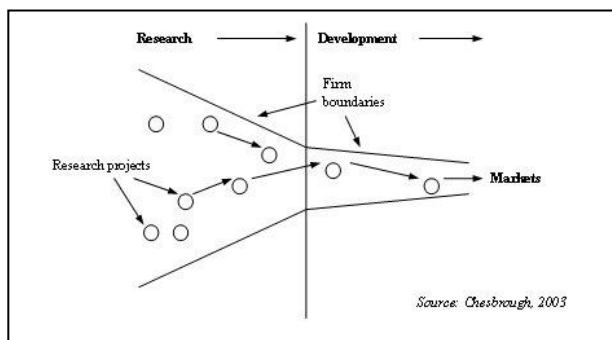
⁹ There may also be fewer welfare payments to make, so the government will save money.

Closed innovation systems

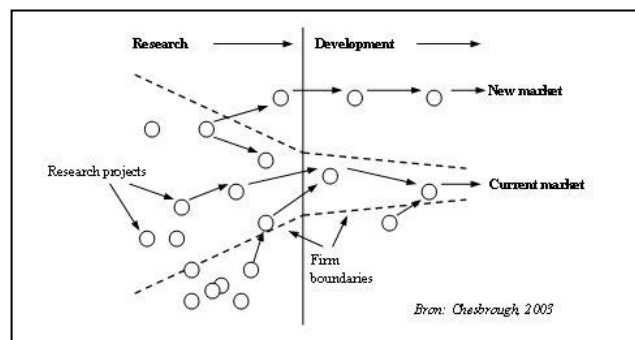
One can argue that up until 1990 innovation was chiefly characterised by a closed system. The innovation process is carried out mainly within the walls of a company and the emphasis lies on total control of and protecting the research, development and economic results. An in-house R&D department, along with the associated expenses, was a necessity. However, more companies started entering the market without in-house R&D departments and profited from other people's inventions while incurring lower costs. This was part of the foundation for open innovation.



The schematic difference between open and closed innovation:



Closed innovation



Open innovation

The difference between closed and open innovation in tabular form:

	Closed Innovation	Open Innovation
employees	All the smart people in our field work for us	Find intelligent people and work with them
labour mobility	Employees work for the same company for a long time	labour mobility has greatly increased
Generating ideas	Ideas are generated	both internal and external ideas are used
First mover advantage	It is important to be the first to introduce an innovation to the market	It is important to have the correct business model
Intellectual property (IP)	IP needs to be protected as much as possible to stop the competition from profiting from them	others may use our IP and we can also use other's IP if it fits with our business model
Venture capital	is often used to finance projects	is used less often
collaboration with universities	less important	important
ROI	low	high

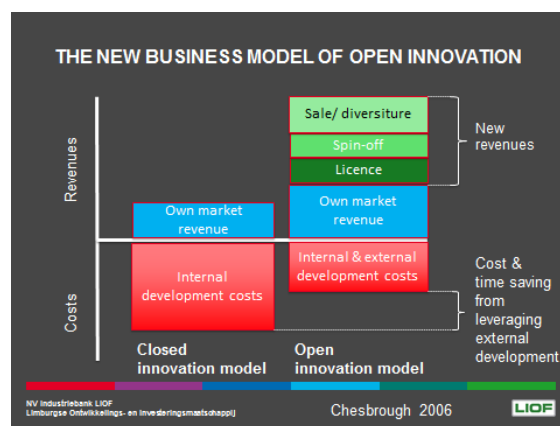
3. Open Innovation

The most important motive for Open Innovation is "The Need for Speed"
 AWT 2006

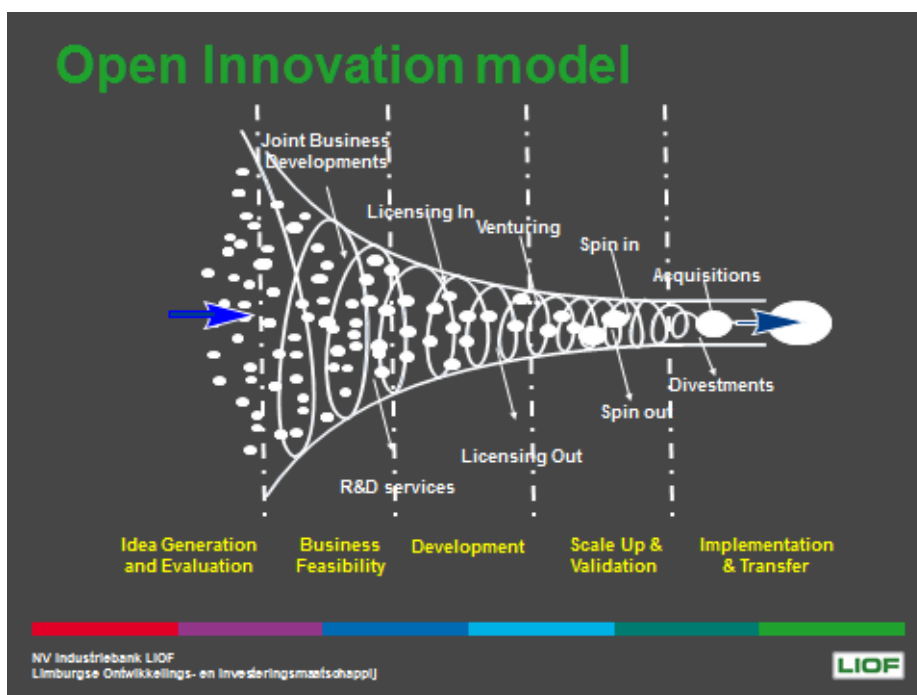
The term *Open Innovation* comes from the University of Berkeley and was coined by Henry Chesbrough, professor and executive director of the *Centre for Open Innovation*. Open Innovation is not new in itself, but is taking off in significance and intensity. This is in part down to increasing globalisation and international competition, fast-developing information and communication technologies, as well as available highly skilled and mobile employees - meaning knowledge acquired is often taken with the employees when they change jobs. The amount of available venture capital is also clearly on the rise. This capital means promising ideas can be developed through other channels, for example in the form of start-ups. What's more, such things as spin-offs and out-licensing increase the number of opportunities to develop ideas outside the company. Finally, there are other players in the chain including suppliers, who are exerting an increasing influence on the innovation process.

Open Innovation is working its way into large multinationals such as Unilever, DSM, ASML and Philips. They want to make their innovation processes more effective and efficient, by actively looking for new technologies and ideas outside the company, for example, but also by collaborating with 'the competition' to create added value for the customer.

Small companies have always needed openness. They find it difficult to undertake a full innovation project internally and are forced to use external knowledge. In the past, the government took measures to encourage external knowledge use.



Open Innovation, however, is more than just undertaking joint research, there is also wide range of possible in and outputs. Working from a funnel model in which a number of ideas transform into concrete products/services, these various in and outputs are represented in the diagram below:



Description of the Open Innovation model

Innovation ideas have to be generated and evaluated during the first phase of the stage-gate process (structured idea generation and evaluation). The following chapter discusses a number of instruments to stimulate this in a structural fashion.

The Open Innovation model specifies the following side streams, that is to say an incoming and outgoing stream:

- **“Joint business development”:**
joint developments with third parties can generate, evaluate and develop better ideas faster and more cheaply.
- **“R&D Services”:**
companies can use their own research and development capacity to benefit third parties and in so doing generate additional income as well as increase their own development insights (more external orientation).
- **“In & Out Licensing”:**
existing and developed knowledge can perhaps also be gained via a licence (cost saving) or made available to third parties (additional income). The way such things are arranged and valued is an important element of this component.
- **“Venturing”:**
offering finance instruments provides the opportunity to secure additional external knowledge in the form of participation.
- **“Spin in & out”:**
is an activity that arises from technological knowledge transfer (external knowledge: spin-in, internal knowledge: spin-out).
- **“Acquisition” and “Divestment”:**
purchasing or selling a business unit that has specific knowledge.

How open is open / what are the consequences?

The transition from a closed innovation model to an open innovation model requires the participating company to undergo a cultural revolution. After all, the company itself does not come up with every idea, nor does it have to develop every such idea. In concrete terms, this means companies need to be open to working with third parties, parties that provide an added advantage in terms of developing new products and services. Third parties are other companies in the sector, suppliers, end users and knowledge institutions.

The basis for an open innovation model is a prime mover in the form of a large company, a group of companies and/or knowledge institution. The government can stimulate the whole using specific driving measures and infrastructure (see following chapter). The organisation is based on individual projects and may be informal.

The business case for products/services that need developing plays a crucial role. After all, how and when external knowledge is applied depends on said business case, which describes how new innovations can create value and what internal and/or external elements need to be supplied. The business case also forms the basis for licence, spin-in/spin-out and venturing and for retrospective evaluations.

Open Innovation is entirely or virtually impossible if the products/services to be developed do not have an unambiguous business case.

4. Open Innovation Policy

The previous chapter describes the Open Innovation model, including its advantages and disadvantages.

This model is applied at the company level but, by linking various Open Innovation funnels, companies can create a large funnel at the regional and inter-regional level and define an entire, or total package of stimulation measures and structures around it. Doing such creates an Open Innovation Policy.

This policy (= methodical approach) can be applied to various thematic approaches (to chemistry, materials, Life Sciences etc. in particular) but is also effective if a campus structure and a number of prime movers can be defined.

Open Innovation Policy in its most simple form consists of:

1. Open innovation funnel,
2. Boost structure (encouraging innovations)
3. Supporting infrastructure
4. Monitoring and control system.

re 1) Open innovation funnel

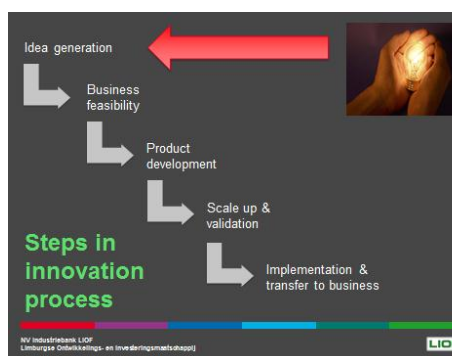
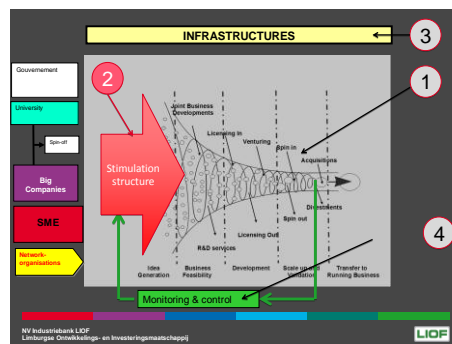
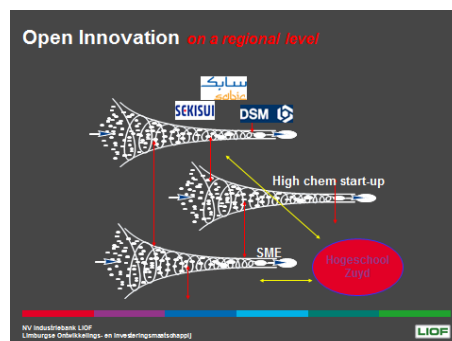
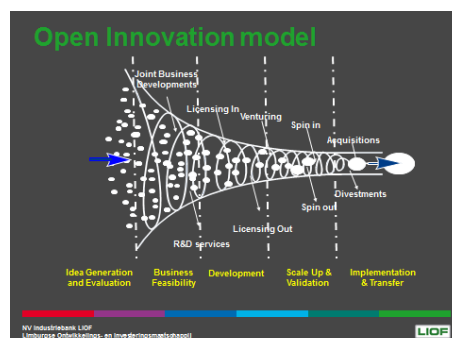
The previous chapter describes the funnel.

re 2) Boost structure

A critical point in decision-making from the government is that it looks often at concrete matters in an innovation process such as process steps, cost categories, terms and conditions, feasibility, prototype etc. and to the innovation actors (universities, research institutes, etc.) and stimulating themes, but that it often lacks the "intangible element". For example, how does an existing or potential entrepreneur arrive at an innovative idea and/or how can they increase the number of ideas or the number of innovative entrepreneurs? This gives rise to secondary issues = such as knowledge workers, knowledge transfer, innovative starters, spin-offs, incubator/campus, instruments (loans instead of subsidies).

In other words, when considering the innovation process, the first part - the generation and subsequent selection of structured ideas - is usually missing.

How to stimulate a company to innovate.



The desire for entrepreneurs to collaborate, something which goes against an entrepreneur's natural instinct, is another element of stimulation. At any rate, if we discuss working on something communally, that's a win/win situation (not a client - supplier relationship).

re 3) Infrastructure

In order to be able to support Open Innovation, you will need, or may want to consider, a number of infrastructural measures. These consist of such facilities as a campus, incubator and thematic cluster links, a set of financial stimulation tools and an expansive venture organisation.

Companies can use existing infrastructure and, where needed, meet specific needs.

The financial foundations and conditions for this infrastructure should be suitable for open innovation, but if the companies lack an open innovation model, they still can use these facilities.

For example:

In Limburg, Chemelot, with support from DSM, acts as basis for Open Chemical Innovation. Numerous businesses active in the chemical, advanced materials and Life Sciences fields have established themselves at Chemelot and are using the facilities offered by Chemelot and using the advantages of being a part of an (open) innovation society. They also can have a relationship with Maastricht University and the Zuyd University of Applied Sciences. Chemelot and universities have incubators to establish high-tech starters.



In Asturias facilitating conditions for the stimulation of economic activities are available at the “*Parque Tecnológico de Asturias*”, where also the headquarter of Idepa is located, as well as a Bio-incubator Incubator and the European Business and Innovation Asturias (BIC).



re 4) Monitoring and management system

Risky and difficult-to-manage processes are characterised by the fact that it is not until afterwards, if at all, that the result can be measured in a concrete fashion, directly or indirectly. The government tries to assess every risk in advance (abundance of detail when applying) as well as to mitigate them (passing on risks to the entrepreneur). Discussing the successes and failures at length retrospectively is also an option, depending on what perspective people take (government, company, knowledge institution, society). Unmanageable external factors (such as the credit crisis) and specific market developments also have an important role to play.

Because the tools for stimulation are becoming increasingly scarce and we are demanding ever more efficiency, more current and permanent monitoring and associated corresponding management system are a good idea here.

To this end you may need to pay more attention to the concrete economic effects felt by companies and society.

Another reason for monitoring and a management system is the application of more revolving funds. On average, small and medium-sized enterprises are not open to external influences that are usually linked to revolving funds, for example a 'foreign' supervisory board. This inhibits the number of innovations. Those granting loans and risk capital will not only look at the innovative content but also at the risk component and the room for yield/repayments.

There is a contradiction between stimulation of innovation and return of investment.

In the case of a “normal” participation approximately 90% of applications are rejected, but from a social point of view these applications may involve great innovations (entrepreneurs are perhaps more inclined to run a risk).

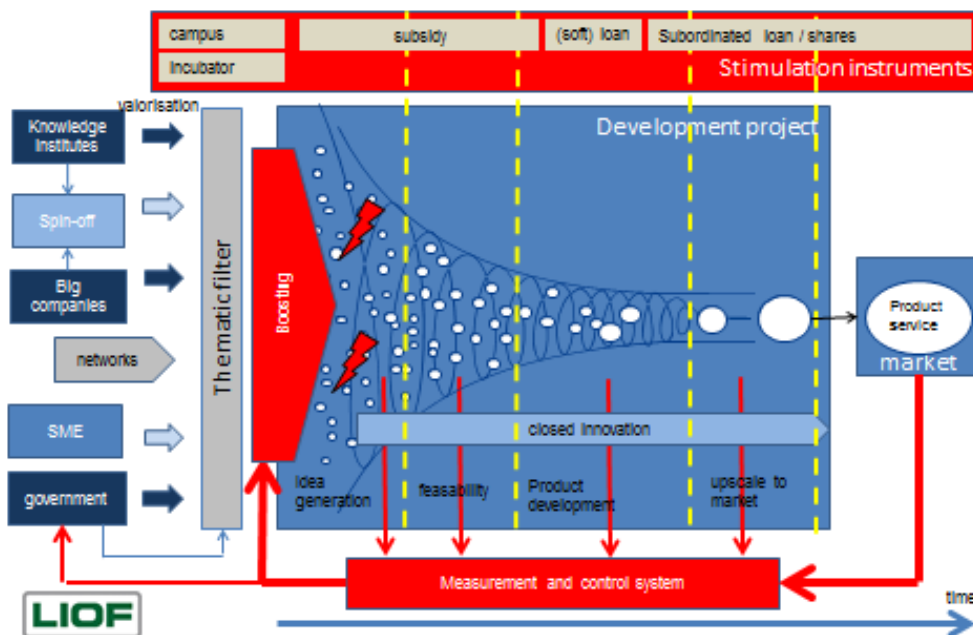
In order to make a proper comparative assessment between revolving and subsidy instruments to create an optimal innovation-stimulating effect, permanent monitoring and an active management system is required. A combination of revolving funds and subsidies is one possible option here.

For example

The Interreg IVA project *CrossRoads* (Flanders – the Netherlands) is currently testing a system called “*Flightmap*” - that is used to monitor development projects at large companies - to see if this system is suitable to apply to Interreg projects. This is being done without a huge amount of additional administrative actions and it dovetails with regular Interreg reporting.

The advantage here, for the ongoing Interreg Project, is also that the project shows how well things are progressing and how the results can be adjusted, if needed. This system also enables political parameters to be converted straight away into a chart (number of projects, the nature of the innovations, expected economic impact, etc.)

A complete overview of the proposed Open Innovation Policy:



5. Europe 2020

The Europe 2020 vision has 3 priorities:

- *smart growth* – for a knowledge and innovation-based economy
- *sustainable growth* – for a competitive low-carbon economy that makes sparing use of resources
- *inclusive growth* – for an economy with plenty of work and social and territorial cohesion

and has been worked out into five quantitative objectives:

1. 75% participation
2. 3% investment in R&D
3. a 20% reduction in CO₂ output, 20% use of renewable energy and 20% energy efficiency
4. to reduce the number of premature school leavers to under 10% and to get 40% of youths into higher education
5. to get 20 million people out of poverty

This should be prepared using a thematic approach with 7 ‘flagship initiatives’

1. **Innovative Europe**
2. **Digital calendar**
3. Step over to a ‘low-carbon economy’
4. **Updated industrial policy**
5. New skills for new jobs
6. A platform for poverty
7. Youth in action

Europe 2020 sets out a new framework for economic reform. The strategy will also determine how new EU policy, which includes structural funds, is designed and will act as the vehicle for implementation. This will mean the new strategy will directly influence future provincial and regional policy.

Position paper ECRN, dated 26 October 2011

On 26 October 2011, the ECRN Board put together a position paper in which it spells out its vision for EU cohesion policy. This cohesion policy plays an important role in numerous European regions. Because the chemical industry is of such great importance to the economies of the regions involved, it contains a number of topics on which chemical companies, local authorities and other institutions and organisations collaborate.

This applies to both developing corporate infrastructure, as well as to promoting research and development, climate and environmental policy, energy, education and training. Moreover, parties often collaborate closely in the financing, transport and logistics fields. The resources in the European cohesion policy can be applied to all these fields.

Experience has shown that the principle of partnership and developing locally and regionally-coordinated strategy development are an important success factors when it comes to optimal use of the structural funds. Looking towards future funding periods, the following points are important from the ECRN's point of view, in particular in the field of innovation and development:

- European cohesion policy should be relevant for every region in Europe, to promote their efforts to achieve sustainable growth and employment and to support harmonious EU development as a whole. The Commission's proposals regarding the scope and design of the future cohesion policy are therefore, in principle, positive;
- The cohesion policy can therefore contribute significantly to the goals of the Europe 2020 strategy by linking them with the strategic efforts at the local and regional levels. To this end it is useful to focus on structural funds and instruments that will have the largest possible leverage. Establishing these themes should however be left to the consultations between the stakeholders in the member states, the regions and Commission.

- With regard to the future implementation of the cohesion policy, efforts to simplify the administrative procedures should be increased.
- In an increasingly globalised industry it is important for us to maintain Europe's industrial foundations and to improve our ability to compete. The principle of integrated production and the development of complex and cross-border value chains is a significant factor for success for the European chemical industry;
- consequently, ECRN asks the European Commission to make sure the initiatives, measures and proposals work closely with the cohesion policy within the framework of Europe 2020.

That is why the emphasis when it comes to the future use of structural funds should lie on:

- Strengthening cluster development along the value chains
- Additional stimulation of research and innovation through initiating open innovation processes
- Improved integration of regional innovation and research initiatives in European research and innovation networks
- Modernising and adjusting the corporate infrastructure to satisfy the changed requirements of modern chemical locations. New and innovative financing models could be developed in this field, with the involvement of the European Investment Bank;
- Promoting cross-border, transnational and interregional collaboration between chemical locations and regions to stimulate best practice sharing and to design cross-border development strategies.
- ECRN will use structural funds over the coming subsidy period to contribute to sustainable growth and employment. In doing so, ECRN actively supports the goals of the Europe 2020 strategy.

6. Limburg situation

National policy

A reassessment has taken place at national level in the Netherlands with respect to the position of companies and entrepreneurs. The government is making an effort to stimulate a limited number of key areas and has made sharp cuts in existing schemes and subsidies. Many subsidies take the form of fiscal measures and there is increasingly less direct assistance for companies. In addition, direct assistance for companies has shifted from traditional innovation subsidies to a generic armoury of resources and revolving funds. This change in course is also in line with the trend taking place in the EU and in the province.

Provincial policy

The province of Limburg has a long tradition in economic policy. During the crisis years of the 1930s, one of the Province's first actions was to establish a finance house, Industriebank Limburg. The mine closures of the 1960s and 1970s marked a period of transition to a new revenue model for the Limburg economy with an expansion of the manufacturing and service sectors. The public company LIOF, a finance house, was established in 1975 to bundle the implementation of these transitions. A cautious innovation policy in the 1980s was elaborated in greater detail in the 1990s, when the regional cluster approach increasingly made its appearance (second transition). The acceleration agendas of 2005 and 2008 brought greater focus to the provincial priorities and changed the provincial role from creating preconditions to simultaneously stimulating new economic growth sectors (third transition). Now that the central government has decentralized the regional economic policy to provincial level, the province focuses on a more detailed expansion of the different campuses, including especially the Health/Chemelot campus and Greenpoort. The aim is to also use the convenient location and good investment climate to bolster Limburg's competitiveness.

Chemelot



The chemical, rubber and plastics industry is well represented in Limburg (about 15,000 jobs). This is more than twenty per cent of the industrial employment numbers. The sector scores high in terms of investment, innovation and export. In addition to two strong workhorses – Sabic (base-chem) and DSM (high-chem) – there is now a cluster of companies, specialized suppliers, service providers and knowledge institutions. Sabic and DSM, like many of the companies in the cluster, are located at Chemelot. Chemelot is an important player in Western Europe when it comes to investment in chemical, biomedical and high-performance materials and activities.

Chemelot comprises the Industrial Park and the Research & Business Campus. The location is centrally located in North West Europe, and it has excellent infrastructure and good connections. Chemelot offers raw materials, utilities, facilities, and an innovative campus. It arose from the industrial site of DSM who which the sole user. The site is developing increasingly as a multi-user site where both the Industrial Park and the Research & Business Campus have unique

dynamics. The synergy for the Industrial Park lies mainly in the utilization of infrastructure, common utilities and integrated permits approach. The synergy for the Research & Business Campus lies in the



added value of bringing together high-quality knowledge workers from public and private institutions and the creation of a highly innovative environment for companies who openly collaborate with each other (open innovation).

In 2005 the Province of Limburg established a policy that targets the developments relating to the Chemelot Campus, as a part of the Acceleration Agenda. This policy eventually led in 2012 to an intensification of the collaboration in the chemical sector and the signing of a memorandum of understanding between DSM/Chemelot, Maastricht University (UM/MUMC+) and the province of Limburg, and a master plan and business case for the Chemelot Campus.

The joint interest of the tripartite collaboration is to promote a strong CHEMaterials cluster. The tripartite collaboration is aimed at promoting open innovation with respect to the retention and development of knowledge in the region. The “goal” is to link and expand “the logical axis” of education, research (scientific and applied) and business. Each of the three parties in the collaboration has a different role:

- UM/MUMC+: role of leading research institution. Education and research will be the starting point where knowledge is mobilized, valorisation is strengthened and with a link is made to business.
- DSM: entrepreneurial role. It will generate business by valorising ideas and patents into business opportunities and stimulating business to business.
- Province: will invest in knowledge and boost business activity to strengthen the knowledge economy (invest and/or subsidise during market failures).

The formation of the Campus Consortium Chemelot expresses the commitment of the three parties to expand the Chemelot Campus over a period of 10 years. The three parties are making resources available with the goal of stimulating and organising open innovation. In total, the three parties will make over € 150 million available for the growth and development of the campus for the next 10 years (in addition to the many tens of millions of euro from their regular activities). As well as this financial commitment, the parties also provide expertise. The Consortium will fulfil the role of “broker” and thus become the unifying factor on the Chemelot Campus in the domain of CHEMaterials in the region and the link to Health and High Tech Systems. Parties will be brought together and knowledge and competencies will be bundled.

Open Innovation Limburg situation (generic)

As described in Chapter 5, the proposed Open Innovation policy comprises:

1. Open innovation funnel
2. Stimulus structure (elicit innovations)
3. Supporting infrastructure
4. Monitoring and management system

re 1) Open Innovation funnel

Open innovation is actively pursued in Limburg, in particular around Chemelot. However, the reality is that many SMEs still opt for a limited or closed innovation system. Consequently, the stimulation of open innovation is still an issue in Limburg.

re 2) Stimulus structure (elicit innovations)

Limburg has a long tradition of stimulating innovation in Limburg companies and many initiatives have been taken to broaden the stimulus package for innovation in Limburg companies.

This stimulus package comprises:

- Stimulus tools (generate product ideas = first phase of the Open Innovation Model)
- Subsidies and investments (see Sub 3). Supporting infrastructure for the Open Innovation Model)

The funding of this stimulus package is project based (focused on specific themes and/or area) and varies in time and place. Combinations of EU (EFRO and Interreg¹⁰) and national and provincial resources are often used.

The stimulus instruments consist of (combinations of) road maps, (specific) workshops, creativity sessions, external business developer, feasibility studies and vouchers.

The main instruments to stimulate innovations in SMEs are:

1. **Vouchers:** Limburg has gained experience since 1995 with the stimulation of a research question in the SME sector by using a limited amount of money (€ 4500 – € 6500) and referring on to specific knowledge providers. This amount is usually a 100% subsidy.

When a potential need is identified, that need can be satisfied by issuing a voucher.

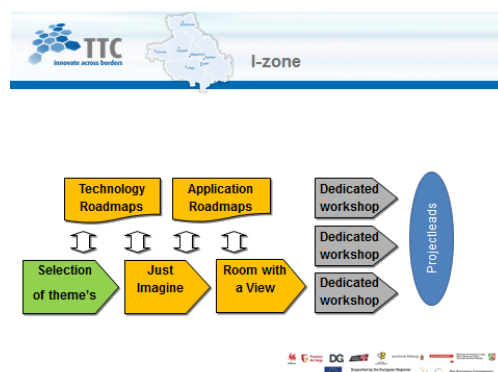


2. **I-Zone approach:**

The I-Zone approach is aimed at actively stimulating and further improving the ability of (manufacturing) companies to innovate. In addition, it focuses in on key sectors that are of great importance: High Tech Systems (including chemicals and materials), Human Health and Food & Nutrition.

To realise the objectives of the program a structured approach was developed that consists of several instruments:

- First, the programme developed a number of **road maps**. These sketched a picture of the current and future developments for a particular technology. These road maps served as the terms of reference for the content of the various meetings (see below) that were organised from within the programme. This action also made the road maps available to the business community.
- Meetings based on these road maps were organised from within the I-Zone programme. In addition, **“Just Imagine”** and **“Room with a View”** meetings were held. These meetings were aimed at providing insights and generating ideas about interesting new technological developments and the market opportunities that these developments offer to the business community.
- Furthermore, the I-Zone programme in the form of **“dedicated workshops”** stimulated the clustering between companies (and knowledge institutions) regarding the development of innovative products, processes and/or product-market combinations. The workshops also made it possible for the outcomes of the aforementioned meetings to be elaborated on further.
- To give substance to these activities, financial support is offered by the I-Zone for **“feasibility studies”**.



The I-Zone approach is also used in combination with vouchers in the project Innovatie ZUID (EFRO OP Southern Netherlands) and Interreg IVA project TTC (Euregio Maas Rijn).

⁵ Note: Limburg is situated in three Interreg A programs and also makes use of the B and C variant

3. External business developer

Experience shows that when a group of entrepreneurs meet to discuss new partnerships and joint development, everything is uncertain in the initial phase and no one immediately takes the lead. The availability of an external business developer with specific knowledge and experience in specific market segments allows partnerships and new joint development projects to be forged. Eventually, the companies involved will have to take over the helm, but by that time the situation will have taken a more concrete form.

This concept is being further tested within the Interreg IVA project TTC.

4. Several cross-border business-oriented subsidy instruments (Interreg)

Limburg has many borders and is therefore active in multiple INTERREG programmes. The programs are used to fund (cross-border) Interreg projects aimed at stimulating and financing innovation in SMEs.

As previously described, Limburg has a lot of experience in stimulating innovation and various methods have also been tried in the past to effectively stimulate an innovation idea with an entrepreneur. The following table provides an overview of the currently used methods and applications:

Name project/ programme	Funding	Network formation	Workshops	Road maps	Vouchers	Business developers	Business subsidy
TTC	Interreg	x	x	x	x	x	
Innovatie Zuid	EFRO		x	x	x	x	x
CrossRoads	Interreg	x	x	x		x	x
I-Zone	national		x	x			
various voucher programmes	Interreg, regional				x		
GCS	Interreg, regional, national						x

re 3) Supporting infrastructure

As described previously, Limburg has a long tradition of stimulating innovation especially with regional funds that make an **(innovation) subsidy** available for an SME:

- The IPL (Innovation Project Limburg) has existed since 1978 within LIOF where regional innovative developments in Limburg companies were stimulated using a subsidy from a limited regional budget. The IPL was continued in 2001 as one of the Triple In incentive funds¹¹.
- During the period 1998 – 2000, the RTP schemes were in force whereby, as part of the Regional Technology Programme¹², subsidies were provided to the Limburg SME (industry, supporting services and young innovative companies). These subsidies were oriented to:
 - external advice on product/process, market and organisational development (RTP advice scheme) and
 - investments in young innovative companies (RTP investment scheme for young innovative companies).
- During the period 2001 – 2007, the Triple In incentive funds¹³ and the Innovation Navigator funds¹⁴ were available. These funds gave support to Limburg companies with respect to

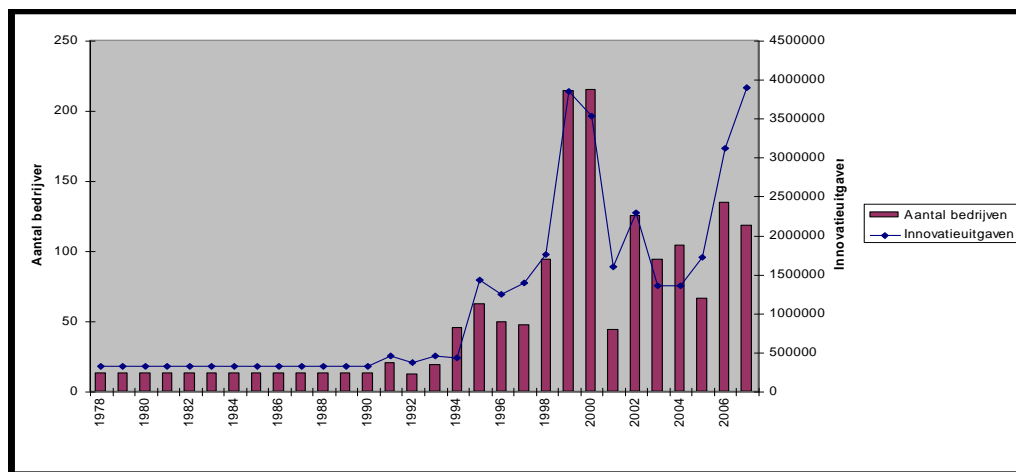
¹¹ co-financed with ERDF funds

¹² RTP is a European initiative from 1995 in which the province of Limburg participated and which a systematic link was made between economic and technology policy

¹³ co-financed with ERDF funds

¹⁴ co-financed with ERDF funds

external advice and concrete innovation projects. An overview up to 2007 is given below¹⁵ showing the number of companies that made use of the Limburg resources for stimulating innovation and the associated innovation incentives.



Source: LIOF 2007 annual report

The budgets for the innovation incentives vary per year. Nevertheless, after 1995 the average government financial support (EU, Ministry of Economic Affairs, province of Limburg, Syntens and LIOF) was € 1 million per year with peaks of € 1.8 and € 1.6 million around 1999 and 2007.

The experience gained in stimulating innovation in Limburg was used to set up the OP Zuid innovation schemes that were funded via EFRO and the stimulation project Innovatie Zuid (see also Appendix 1). Both projects became operational in 2008 and are still running (but only partially, due to depletion). In addition to these measures, Limburg companies can also make use of the national subsidies such as those offered by Agentschap NL.

Revolving funds

The financial stimulus measures are currently subject to change. The legislator has opted for more of a “revolving” approach (loans, etc.). However, practice shows that loans and guarantees, in whatever form, are only suitable when the business case is clearly defined and it is possible to specify who, how and how much will be repaid and how the risk can be shared.

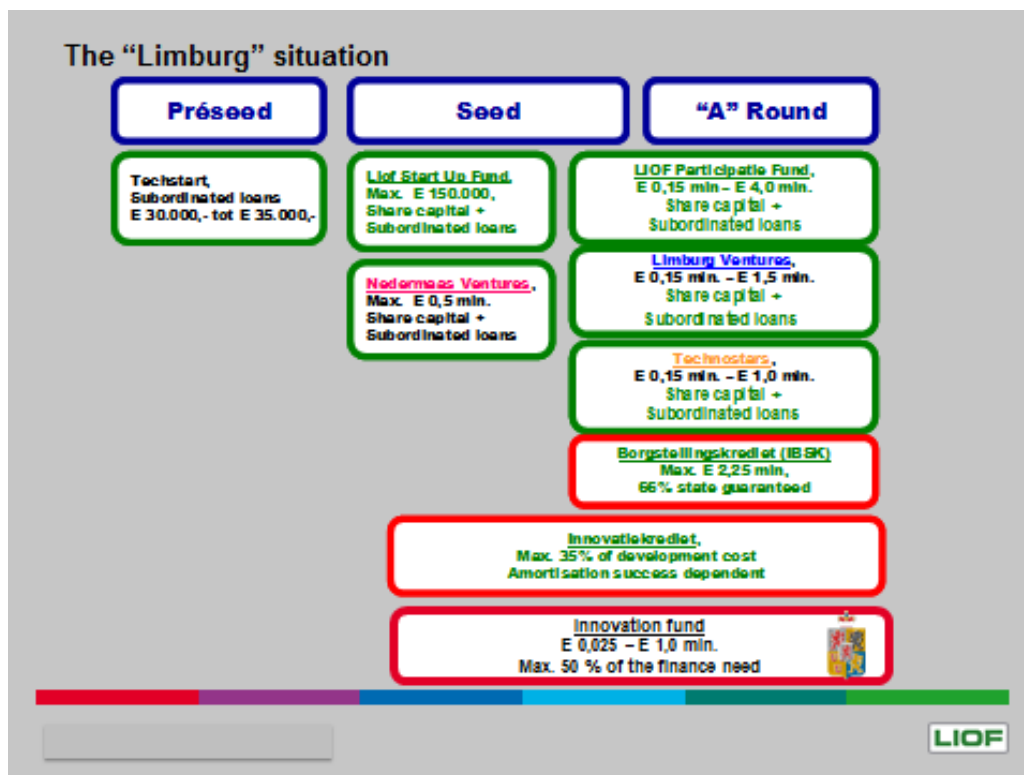
The measures for the stimulus scheme are not known in this business case, and even the ideas, partners and collaboration relationships are not yet known. It is therefore almost impossible to make “revolving” agreements. If one or more entrepreneurs are known but the risk is still quite high, a partial subsidy will also be needed to stimulate a development.

Experience shows that loans to fund the implementation of such a development are possible (business case is known).

Note that state subsidy provisions apply even for revolving measures.

¹⁵ As of 2008, the Limburg innovation incentives were applied throughout the Southern Netherlands and there are no clear-cut figures available for the Limburg portion.

A comprehensive package of venture funds is currently available in Limburg. An overview is given below:



re 4) Monitoring and management system

To date, the effects and efficiency of the various stimulus projects and programmes have been evaluated by an external agency. Entrepreneurs (both involved and not involved) were also asked to speak about their experiences and desires. This evaluation was usually carried out after the project had ended (project duration is often three years) to provide time for a judgement to be formed.

A pilot is currently being carried out in the *CrossRoads* project to make a system (*Flightmap*), which is used to monitor the project development in large companies, suitable for use in Interreg projects. This is being done without any major additional administrative actions and is aligned with the normal Interreg reporting.

7. Open Innovation Policy in Asturias

Over the last years Innovation has become a crucial issue for companies and their business strategies. Commitment towards a model of Innovation Management so-called “Open Innovation” is growing; this model bases on the idea that companies are able and also obligated to use both external and internal ideas. This type of innovation is related both to the product and the Management Model, and the flow of knowledge is interdepartmental: between companies and with universities, institutes, the public sector and users.

Companies of the chemical and process sector in Asturias develop these main activities: manufacture of fibers and plant protection products, nitrogen fertilizers, active substances for medicines, carbochemistry, cleaning products, wood pulp, iron and steel industry products. This sector is more and more committed with an innovation related not only to products and processes, but also to management, purchasing, logistics or human capital.

Most of companies of this sector, grouped together around AIQPA¹⁶ and IQPA¹⁷, are public limited companies or limited companies, family business in some cases. There are two types of companies: those with one or more workplaces all located in the region and national and multinational companies with at least one workplace located in Asturias, but having their headquarters outside the region. In this last case, Strategic Planning Centres are not always in Asturias and main actions of Strategic Planning are defined and managed according to the global policy of parent companies. However according to the general tendency towards opening innovation, ideas can emerge at any level and conversion of these ideas into projects is increasingly performed in a structural way, instead of vertically. Commitment is with an innovation “coming from employees” and towards continuous improvement, having in mind not only workers but clients and suppliers as well.

In addition future basis commitment of those companies with workplaces and headquarters in Asturias is clearly towards an open R&D&I that encourage companies to improve competitiveness and access to new markets.

As already mentioned, companies whose experiences are herein reported, are members of IQPA. Such companies especially highlight the open and promoting attitude of the Regional Government, research centres and the University of Oviedo towards R&D&I; however most of them agree that, even if their relationship with those institutions is fluid, it should be more active and open. The common and ultimately purpose of this sector is to satisfy the needs of society and, in order to do so, knowledge coming from the University and support of the Public Administration are needed: that is, support for the sector as well as monitoring compliance with regulations.

Companies of the sector often collaborate with the University of Oviedo in joint projects and studies, in particular with departments of the Faculty of Chemistry, Mining and Industrial Engineering; also, interns from the University are hired by companies and researches are carried out by companies and supervised by the University.

Collaboration with the Administration usually differs and based, not on the development of specific projects, but on regulatory compliance. Companies like DuPont normally collaborate supporting the IDEPA¹⁸ raising funds in Asturias, meeting potential investors and sharing its positive experiences with the regional government.

Companies of the sector increasingly tend to collaborate together and with other related companies, as well as with suppliers and clients, in developing joint projects for product improvement, creation of new products, and process and organization improvement (SAP, Call Centres). An example, the

¹⁶ Asociación de Industrias Químicas y de Procesos de Asturias: Association of Chemical and Process Industries of Asturias

¹⁷ Cluster de la Industria Química y de Procesos de Asturias: Cluster of the Chemical and Process Industry of Asturias

¹⁸ Instituto de Desarrollo Económico del Principado de Asturias: Economic Development Agency of the Principality of Asturias

collaboration between DuPont and Chupachups in the bioprocessing plant: the purpose of this joint project was to use high-glucose waste materials of the candy manufacturer to treat sewage waters at the multinational's facilities.

By grouping companies of the chemical and process sector, IQPA tries to lay the basis of future collaborations between companies for improving the competitiveness of the whole sector.

Idea Generation

• Interviews

Companies of the sector periodically meet other leading innovation companies and institutes in order to keep up to date with the latest tendencies and technological developments. They attend conferences organised by entities such as AIQPA, Innovation Club of Asturias, Quality Club of Asturias or Federation of Employers of Asturias on issues related to R&D. Most of the companies are members of these organizations and participate in the preparation of discussion forums.

Meetings are arranged with leading institutes:

- INCAR¹⁹
- ITMA²⁰
- Other international Institutes: in Germany, Poland or England, among others.

Specific meetings are also arranged with

- Clients and suppliers related to their specific activities, e.g. collaborations between Ence and its suppliers or Technologists: Metso, Andritz, BMH or Salasti
- Fairs and conferences about specific productive activities where tendencies and novelties are shared.
- National and international consulting companies and strategy consultant's offices.

• Creativity Sessions

Many companies of the sector also organise creativity sessions (in their own facilities) for encouraging entrepreneurs, at a structural way, to think without restrictions about new products and market opportunities. For example:

- Interdepartmental meetings: potential problems are openly presented and any solution and/or improvement proposal is considered.
- Interdepartmental meetings on consumption, energy efficiency or new products, opened to all divisions of the companies (Management, R&D, Production Department, Environmental Department, Security ...)
- R&D&I Committees with several participants: shareholders, management, technicians...
- Scientific Advising Board in Industrial Química del Nalón
- R&D&I Management encourages joint work of company's research personnel with distinguished researchers of several organisms for creating coordinate research groups. Research agreements are signed between research public centres and universities.
- Teams on Substantial Improvement focused on obtaining Substantial Improvement Targets in Ence.
- Teams of Specific Analysis focused on improving concrete areas or teams in Ence.
- Task force: work groups within the company for evaluating concrete problems in Ence.

• Workshops

Companies of the chemical and process sector in Asturias participate actively in AIQPA's Work Commissions, in which work groups meet periodically to discuss issues of common interest on matters like Security, Environment, Technical Implementation.... Emerged proposals and ideas are then analyzed in Discussion Forums.

¹⁹ Instituto Nacional del Carbón: National Institute of Coal

²⁰ Instituto Tecnológico de Materiales: Materials Technological Institute

Members of the sector also participate in other work groups created by The Federation of Employers of Asturias or FEIQUE²¹. Companies also create collaboration groups between their own branches in order to evaluate their improvements on processes, products and new developments.

- **Dedicated workshops**

Regarding the creation of work groups developing concrete innovation projects, some companies of the sector centralize these activities on their headquarters, near to their Strategic Planning Centres. For this reason specific groups working on future innovation projects do not exist in regional branches; however this is a routine practice in other companies where the following work internal groups are created:

- Innovation Committees or Technology Director working on a routine basis and on several projects.
- Specific groups are created for concrete innovation projects; Ence created a group for a project dedicated to measuring wood volume through 3D scans.
- Collaborations with research centres, engineering companies and suppliers for improving processes, products and new developments.

- **External Business Developer**

Most of the companies do not consider the option of working with external specialists experienced in helping companies and institutes in converting projects into concrete innovation projects, i.e. external "Business Developers". However it is true that companies usually have big Strategic Planning Centres in other facilities with specialist personnel on the sector.

Nevertheless some member companies of IQPA commit seriously with this type of innovation, based on the product as well as on management, purchasing, logistics, human capital... therefore in each specific case, and depending on the "type of innovation", these companies turn to appropriate specialists looking for help for ending projects. Examples:

- Collaboration between Fertiberia and the University of Oviedo regarding one specific issue related to the improvement of sulphate nitrate production at a local level;
- Collaboration between Industrial Química del Nalón and Renaul Consulting for optimizing production: lean manufacturing.
- Ence developed a Plan for improving the availability of dry wood pulp in the area.

- **Feasibility studies**

Feasibility studies, used for supporting the development of projects and checking and fixing expected results, are usually prepared internally within the companies of the same group and together with contractors, suppliers and research centres like ITMA or INCAR. Those companies investing permanently in R&D&I prepare technical and feasibility studies for each project and in some cases also get the support of collaborative organisms like CDTI.

- **Innovation vouchers**

The use of Innovation vouchers, understood as fast searches for answers at technology questions, presents differences among the companies of the region. In order to find solutions to specific technological issues that may arise, most of the companies rely on their own Technical Departments of factories and headquarters, made up of experts on R&D&I. Although this is a major tendency, specific alliances also exist with experts of a particular area and for a concrete project. For example: a project on biotechnology that a priori has been completed, and for which an external expert shall be hired at a later date to take a step forward to the solution initially proposed.

- **Innovation scans**

Innovation scans or structural scans for innovation possibilities within a company are one of the main pillars of this sector Business Strategy. Companies of the chemical and process sector in Asturias are really committed with structural innovation, as innovation activities can be performed

²¹ Federación Empresarial de la Industria Química Española: Business Federation of the Spanish Chemical Industry

at any company level. Although vertical strategy innovation still exists in some cases and in specific areas such as nanotechnology, most companies are committed with an innovation “coming from employees”.

Examples:

- Industrial Química del Nalón has developed a working system -**Nalón Pro-System**-for achieving excellence in value chain. Constant improvement of competitiveness is one of the pillars of its Business Strategy, so the system was created as a dynamic element of continuous improvement in all business processes. Nalón Pro-System considers people as the mainstay of an organization in which team working is a priority. As it is considered the system of reference within the company and it is totally aligned with the defined business strategy, Nalón Pro-System has the following objectives:
 - Quality and service in every sense of the word: products, processes and management, through the best available technology and a culture of prevention and innovation.
 - Profitability, regarding stability of margins and profitable business.
 - Sustainability, by guaranteeing a long-term future through honesty, business solvency and respecting environmental requirements.
 - Security of people, facilities and environment, through modern facilities, employees' training and pro-active approaches in Work Safety Prevention.
- In the Pharmaceutical Chemistry field Bayer has established an initiative called “**Operational Excellence**” with the purpose of improving and continuous innovation in generating improvement and innovation ideas among employees, ideas that once implemented make success possible.
- Ence (Navia) has organised the following work teams:
 - Teams on Substantial Improvement focused on obtaining Substantial Improvement Targets.
 - Teams of specific analysis focused on improving concrete areas or teams
 - Task force: company work groups for evaluating concrete problems.
- Ence uses two fundamental methods for internal innovation: the Ishikawa diagram of cause-and-effect following the 4M's model (men/people, materials, method and machinery) and the PDCA diagram for continuous improvement.

Business feasibility

- **Joint business development**

Companies of the sector located in Asturias often developed joint business, i.e. collaborations between different parts of the business –clients, suppliers, competitors-, with a specific objective, sharing both risks and results and profiting from each other's experiences.

Some examples of joint business:

- Fertiberia collaborates with many producers, agricultural cooperatives, professional associations and agricultural companies; this increases chances of success of projects and their application field, and makes easier transferring the generated knowledge to final users.
A concrete example: the creation, together with a client, of the company AGRALIA.
- Bayer: standardization of suppliers agreeing quality assurance for specific products.
- Asturquimia: analysis and development of a security plug in collaboration with a plug manufacturing company.
- DuPont: Sontara® and Novatex®
- Industrial Química del Nalón: wind business with a German group (ABO Wind AG); has a holding in ENTRECHEM, a biotechnology spin-off company created by the University of Oviedo; it also develops projects with many national and international clients and companies. This company does not develop joint projects with competitors but it takes part in national and international associations defending the sector's interests.
- Ence: collaborates with clients in adapting quality parameters depending on each client's needs (custom-made wood pulp orders). This company also collaborates with its suppliers -TAELO, RAUMASTER, BHM o IBERIMPRO-preparing bio-mass.

- **R&D services**

Companies of the chemical and process sector in Asturias do not usually offer R&D services to third parties; they share their built-up experiences and know-how only with clients and suppliers, but never as a formal business. However some companies have a holding in other companies that offer this kind of services to third parties: Fertiberia for example owns 50% of INCRO, an engineering company that commercializes technology of the fertilizing sector in several countries.

Development and innovation of products

- **Licensing in**

Licensing in is used to obtain IP that is interesting to develop new business, incorporating innovation from external organizations (technological companies and research centres) in the form of ideas, patents, technologies and products. This is an innovation measure that companies of the sector exploit occasionally. Examples:

- DuPont: licences for product/ process version in Sontara®
- Fertiberia: process simulator of a nitric acid plant (computer development)
- Industrial Química del Nalón: works with its own patents but also purchases when necessary.
- Ence: generation of dioxide through HPA process.

- **Licensing out**

License granting or technology transfer: it entails commercializing the innovation generated by the R&D Department or using IP to create strategic and financial value. Most of the companies of this sector located in Asturias do not commercialize the innovation generated within their R&D departments, although they sometimes used it to create financial and strategic value. There are some exceptions to this fact: the above mentioned case of Fertiberia and its subsidiary INCRO which is in fact dedicated to technology sale within the fertilizing sector in several countries.

- **Venturing**

This option (investing in start-up companies, having an interesting fit with companies' technologies or markets, with the aim to shorten the time to market and absorbing specific technologies or opening new markets) is not commonly used in the region. However there are some significant examples:

- Fertiberia set up AGRALIA and nowadays holds 100% ownership. This company –AGRALIA – sells all liquid fertilizers in its different versions as well as solid fertilizers of other factories of the same group.
- Industrial Química del Nalón has a holding in the following companies:
 - Entrechem: a biotechnology company created as a spin-off company at the University of Oviedo.
 - Anes Innovación: promotes research and development of new knowledge and new technologies in the field of chemical and biological based processes.
 - AMURA wind farm: set up by the German group ABO Wind and Nalonchem, a company specialized in carbochemistry.
- Ence coordinates its forest management in Spain through its subsidiaries NORFOR and SILVASUR. IBERSILVA, an agro-forest and environmental services company, was also created for carrying out external forest services.

Regional Policy of Innovation

- **Spin in.**

Small investments made in start-up companies that have been sold off by other companies or which have been identified because of their special interest technology or market. This option of investment is not widely spread in the region, either by the fact that Strategic Planning and Decision-Making Centres are located out from Asturias or that companies are SME's with little investment in this sense. However there are some exceptions to this general tendency such as the presence of Industrial Química del Nalón in the Pharmaceutical Business through the company Entrechem.

- **Spin out**

After the development phase of a project, a start-up company is established to develop the business further, since it is easier for a start-up company to come out into the market and to develop the product than for its parent company. In our region this practice is not common either, as a technique for speeding up businesses; however again some companies like Industrial Química del Nalón are exceptions and commit with this kind of investment (Industrial Química del Nalón has set up Anes Innovación for participating in the business of waste materials and sustainability). In this sense Ence also has developed its forest division through the companies NORFOR and SILVASUR, and has created an agro-forest and environmental services company for carrying out external forest services: IBERSILVA.

- **Acquisitions**

Acquisitions of other companies for fixing business and strategies are made with the purpose of increasing the value of the acquired company, although financial and strategy purposes are different. Acquisitions can be made within companies of the same sector, competitors, for gaining more market power, for entering into new market segments or for geographical reasons. Some examples existing in the region:

- Acquisition of ADP by Fertiberia following the international expansion strategy initiated with the acquisition of Argelina Fertial; this means opening a new market, the Latin-American market.
- Industrial Química del Nalón has entered wind business supported by the German group ABO Wind AG.
- Acquisition of Danisco by DuPont for increasing its offer in applied biosciences and health and nutrition sectors. Danisco has facilities in Spain.

- **Divestments**

Regarding divestments and loss of assets: in Asturias Industrial Química del Nalón left the potassium permanganate business and, at a national level, Fertiberia closed some factories – Cartagena and Bilbao-due to a restructuration of the fertilizers sector. Also Ence sold TECFOR, a company dedicated to forest techniques.

Own capacities

Asturias is a region situated in the north of Spain that is characterized by its diversified industrial network and the historical presence of big companies. The chemical and process sector is highly recognised for contributing to sustainable development as well as for being an undeniable reference of diversification and generation of high added value in the region, with an international future-basis approach.

Activities of the chemical and process sector in Asturias could be classified as follows:

- Carbochemistry
- Fertilizers and manure products
- Pharmacy
- Agar production
- Plastics
- Paints and explosives
- Advanced fibers
- Iron and steel industry
- Wood pulp sector

Chemical and process companies in Asturias are grouped together around AIQPA and IQPA: the aim of these organisations is to agglutinate all companies of this sector, and other related sectors, for defending their common interests, increasing sectors' competitiveness, creating discussion forums and laying the foundations for future collaborations between companies and related organisms.

Asturias has an important University Campus with recognised research groups that collaborate with

the R&D&i departments of the companies located in the region; there are also specialized institutes and research centres such as INCAR, ITMA, SERIDA²² or IPLA²³.

As for the financial structure of the region in regard to companies, financing comes mainly from the private sector although public aids, European funds and subsidies are also granted for developing specific projects.

	sector/main activities					
Best practices	Carbo-chemistry	Pharmaceutical products	fertilizers	Synthetic fibres	pulp	Cleaning products
Idea generation:						
Interviews	x	x	x	x	x	x
Creativity sessions	x	x	x		x	
Workshops	x	x	x	x	x	x
Dedicated workshops;	x			x	x	x
External Business Developer:	x		x		x	
Feasibility studies	x		x	x	x	
Innovation vouchers	x		x		x	x
Innovation scans	x	x	x	x	x	
Business feasibility:						
Joint business development	x	x	x	x	x	x
R&D services:			x			
Development:						
Licensing in	x		x	x	x	
Licensing out			x			
Venturing	x		x		x	
Scale and validation;						
Spin in:	x		x			
Spin out:	x		x		x	
Acquisitions	x		x	x		
Divestments	x		x		x	
business cooperation						
with another company	x			x	x	x
cluster (with several companies)	x			x	x	
company /university	x	x	x	x	x	
Company/regional government		x	x	x		

²² Servicio Regional de Investigación y Desarrollo Agroalimentario: Regional Service for agro-food R&D

²³ Instituto de Productos Lácteos de Asturias: Dairy Products Institute of Asturias

8. Open Innovation Policy in Novara

Novara is a province within the region of Piedmont and in Piedmont 12 Innovation poles are identified on the basis of the specific technological vocations of each provincial area. The Poles are complementary and connected by cooperation relations. The Pole is a structure founded with the contribution of the European Regional Development Fund (ERDF) within ROP 2007-2013 and co-financed by the European Union, the Ministry of Economy and Finance and the Piedmont Region, with the purpose of enabling innovation-oriented companies to have access to high added value infrastructure and services and to research and innovation funds.

One of these poles is the Sustainable Chemistry Innovation Pole that was founded in Novara in 2009. The purpose is networking the skills and experiences of the most innovative chemical companies in the region and stimulating, through an animation process, the different players of the value chain, with the objective of innovating the chemistry, making it more compatible with the environment.



Currently, the Pole of Novara groups 24 companies (start-ups, small, medium and large companies), 3 Piedmont universities and the Province of Novara. They are all members of **Consorzio IBIS** (*Innovative Bio-based and Sustainable products and processes*), which has its legal office at the Industrial Association of Novara. IBIS is also the managing body of the Pole and it is responsible for the incentive, the coordination and the selection of the demand for innovative services and projects that comes from the members. IBIS is characterized by a very simple organization open to other members interested in its opportunities and potentialities.

The Sustainable Chemistry Innovation Pole have two strategic lines to be implemented with appropriate research and development projects:

1. Products from renewable and biodegradable raw materials (BIO-Based products);
2. Reduction of the environment impact with process modification and product substitution.

In the first strategic line, the starting point is the higher and higher interest that the renewable raw materials have for the industry, due to the problems of energy supply and environmental sustainability. The importance of bio-based products is confirmed by the latest approaches of the European Union, which has identified in these products one of the six key sectors considered strategic for Europe and on which it has decided to concentrate the next regulatory and research efforts (Lead Markets Initiatives – LMI).

By using physical, chemical and biological processes, materials such as vegetable oils, starch from cereals and potatoes, cellulose from straw and wood, lignins and aminoacids can be converted to fuel, chemical intermediates, polymers and other specialty products. In this way, the use of oil, as it has been done till now, can be avoided. Bioplastics enjoy a particular interest as they have properties similar to the ones of conventional plastics, but with the possibility of being completely biodegradable and compostable.

The second strategic line is focussed primarily on the low impact processes, which face a double challenge: make a technique or a process, that already exists, more available by investing in innovation in order to make it even more available (for example, in terms of low costs); modify the processes, as far as their sustainability is concerned, in order to make them available in the future. With reference to the products with a low impact on the environment, on health and on safety, the references must be found:

1. in the process of replacing products with more compatible ones (a strong stimulus in this direction certainly comes from the entry into force of the European regulation on chemical substances "REACH;

2. in the improvement of the environmental quality of the products, using for example the voluntary eco-labelling tool (i.e. the European Ecolabel);
3. in the eco-design techniques, aiming at a better management of the end-of-life products.

The strategic lines should also guard the element innovation in sustainable chemistry. In other words, the crucial question that has to be faced is if the new innovations are really in the wake of sustainability or if it is just a “cosmetic” statement. The Pole, devoted to “Sustainable Chemistry”, will have to be able to provide to its member companies the methodology and the criteria applicable to their innovation processes/products in order to give this kind of guarantee.

8.1 Birth and development of the Sustainable Chemistry Innovation Pole

The first step in the development of the Sustainable Chemistry Innovation Pole was the creation of the so called “Consulting Committee of Stakeholders”, aimed to analyse the local situation and gather all the possible interested actors.

The Committee was composed by local entities, trade and industrial unions, chemical platforms and chemical industries, it lasted for two years and in its final report the main decision was that chemistry was an important field of development and a Pole for sustainable chemistry was suitable for the area. This decision was due to different reasons, like:

- the long chemical tradition of Novara;
- the high presence of leading innovative chemical industry on the area;
- the REACH and the new pressures for a sustainable development;
- the position of Novara (close to Lombardy and on a crossroad among two main European corridors);
- the presence of a universities with a chemistry department;

Through the work of the Committee, an early action plan was made, mainly consisting in these 3 actions:

1. to establish a Technological District on Sustainable Chemistry (*not a Production District*);
2. to apply for European and State Funds under a Special Legislation to finance the initiative;
3. to study an organisational form to finance the risk of applied research of SMEs.

The discussion open with upper authorities responsible for financing, in particular Piedmont Region, led the stakeholder partnership to turn the idea of a technological district into the new form of Pole of Innovation, much more aimed at realising research activities and, for that, more suitable to attract European subsidies.

In addition the Region imposed two conditions for the creation of the Pole:

- a significant number of Piedmont chemical companies had to express strong interest about the initiative in advance,
- a preliminary list of three/four project ideas unifying the interest of most companies had to be ready before the Pole started its activities.

Thanks to the effort and competence of the province of Novara, the Region's conditions has been fulfilled. This result has been achieved through the organization, by the Province, of a meeting to gather the 10 top chemical industry in Piedmont. Three main actions to be carried on emerged from this meeting:

- the Innovation Pole had to be set in Novara;
- the Pole field of action would be Sustainable Chemistry and bio-based Products;
- the companies were ready to join common projects about the following project ideas: biofuels, bio-based products as biopolymers and biopesticides, product recovery and valorisation.

Last but not least, the stakeholders had to underline the importance of the European funds that, through the so called POR-FESR (regional program on ERDF), made it possible.

8.2 Critical points of the development period

the first critical point individuated is strictly related to the Pole functioning, particularly for what concerns the creation, sharing, financing and carry out of research projects, where the following weaknesses have emerged:

- double preparation work for companies (Pole action plan + final application),
- double assessment stage that extends time to market,
- no checks «in itinere»,
- only administrative checks later on,
- only partners from the same Region are accepted,
- bad assessment of the partnership,
- limited number of SMEs participating to the project due to high financial risk for them (they are asked to give a 10% participation fee),
- too detailed project type requested and different amount of funding by project;

Innovation should be unexpected and work by itself; to be called like that, it does not have to follow precise criteria and the ones mentioned above are too complicated.

All these weakness highlighted that the current system has to be improved and clarified, through new and more adequate regulations able to facilitate and foster the development of research projects.

The second critical point during the creation of the Pole, as well as during its current development, emerged a lack of coordination and sharing among the different regional Innovation Poles. This could be defined as a “lobby problem”: limits as localism and few interest on this task by the authorities didn’t allow the creation of a lobby system beyond the single Pole, lobby that could influence political and economic decisions much stronger than current ones. Moreover, a better co-operation among Poles could carry on stronger and bigger projects and, in the mean time, attract more funds. This problem is partly caused by the two reasons reported above but, also, by a European/national regulation not suitable and not adequate to step forward and combine the existing energies all over the area to get into a proper multi-sector system.

In addition to the limit defined above, another critical point has been individuated in the poor capitalization and exploitation of national and European experiences regarding Innovation poles. For the Italian situation different regions have developed Innovation Poles: it seems to be logical and reliable that these Poles, at least the ones with a similar target and composition, work together and share experiences among them in order to improve their functioning and solve their inner problems by learning from each other. Unfortunately this is not the situation, as every Pole works only by itself (except some rare case) and care only about its development. In this sense, a better coordination among them and a better regulation at national level could improve the whole situation. Regarding the European situation, it’s even harder to coordinate this capitalization, as different national rules and national economic interest are real obstacles to this process.

8.3 Lobby system

In the Novara region a lobby is needed on the 3 issued just analysed, with different solutions but all 3 strictly connected:

In the first case, a European lobby could be the best solution, following these steps:

- to gather the main stakeholders of the Poles with similar problems on innovation project development,
- to collect all the critical points highlighted and focus on the most common ones,

- to try to identify solutions, lobby actions, first at national level and then at European level in order to underline the limits and the matters concerning the current regulation and help the authorities to find out good and shared solutions.

In the second case, a regional lobby would be the best solution, to gather the main stakeholders of the regional Innovation Poles, to discuss common problems and understand how to set up a better coordination among them, to analyse the current regulation and advance proposal to foster the joint work of different poles (maybe through grants) and present the emerged conclusion to the authorities. In this case, A very important step to be taken first of all is that a local entity (the Region would be the most appropriate) should take the initiative and convince the Poles to cooperate in a lobby and show how they can take advantage indeed through it.

In the third case, an action should be undertaken directly by European and national authorities due to the wideness of the audience involved. Through net/programs as ECRN and Interreg, a better communication system among Poles should be set up: projects as ChemClust are the evidence that some actions have been taken in this way, but it's not enough. A stronger involvement of the European institutions is necessary to coordinate this process: a better addressed funding system should be created to foster the interregional cooperation, breaking down the still existing barriers between different states and encouraging a fair and profitable cooperation.

The 2 main lobby actions should be:

- A. A local lobby system for ERDF (the most suitable entity would be the province) could help the Region to better address funds in order to plan programs closer to the local industry's needs. It should start from the base and collect the opinion of the different entities composing the Region. This condition should be inserted in the regional regulations and supported by the general European regulation. The local lobbies must be consulted during the document elaboration and before any important changes. At the moment ERDF is mainly managed by the Region that, according to the European directives and with the EU approval, decides barely by itself how to allocate European Funds through the planning of regional development programs.
- B. Within the regional ERDF programs, a new action should be undertaken to improve and foster directives concerning open innovation: the creation of new instruments, like networks, connecting local entities of different countries with each others and allowing them to develop their own proposals beside the ERDF regulation, in order to obtain implementing regulations on open innovation through a deeper and more specific knowledge of the local situations and avoid waste of money or resources due to a decision system too far from the local productive reality.

The lobby actions must be aimed at influencing ERDF general regulations as well as regulations related to apply specific regional ERFD programs or to implement European Territorial Cooperation programs (INTERREG) and others.

An action addressing the general ERDF regulation, with the scope to insert elements and conditions which can result more favourable to chemical industry and chemical territories, can be done only by a European organisation and must have a European dimension. It must also be based on studies which can show the importance of the proposed rule modifications and have been carried out at European level or at least in the majority of the concerned countries. ECRN and ChemClust results are examples of this requirements.

Another action to be developed at such level is about proposals of changes in the regulation of programs like European Territorial Cooperation (also called INTERREG) in its diverse branches, Competitiveness and Innovation Program (CIP), European Intelligent Energy (EIE), 8th FP, Marco Polo and so on. All that with the same objectives above mentioned about ERDF.

But ERDF is applied at regional (or national) level and regions are the situations where often the most valuable grants can be got. So it's not to avoid the need to make regional chemical stakeholders be

able to influence their own regional or national regulations of ERDF for the parts affecting chemistry. This can be done with a training action involving local partnerships as far as possible as well as through a great program of exchange of experiences.

9. Open Innovation Policy in Schleswig Holstein

The landscape of the chemical companies in Schleswig-Holstein is divided into the following sectors:

- basic industries with a focus in Brunsbüttel,
- pharmaceutical large companies in Bad Oldesloe Hohenlockstedt,
- plastics processing companies in Stormarn and Lübeck and mid-size processors, with an main focus in the Hamburg area.

In the cluster "Chemicals and Mineral Oil", which is starting up in Schleswig-Holstein, are specially the primary industry and the plastics processors represented. While the industrial activities are mainly consist of production units of multinational corporations, research and development has no regional significance. The corresponding units are located in the corporate headquarters outside of Schleswig-Holstein. The regional medium-sized companies have no established innovation strategies. However, particularly SME's are often in intense exchanges with universities (especially the FH Lübeck). In cooperation with the Economic Development and Technology Transfer Corporation of Schleswig-Holstein (WTSH) could be detected, during a workshop in Geesthacht, that especially SME's are open for new and innovative strategies. However, the question raised to which extent open innovation approaches will be taken by companies and how an open view of their own development work would be accepted.

A culture of innovation - as a basis for open innovation - is within the chemical companies in Schleswig-Holstein weak. Within the project it was found that the chemical field of open innovation methods play in practice no role. Therefore, the project aimed at identifying specific approaches, such as open innovation processes within the existing innovation support in Schleswig-Holstein, could be promoted and stimulated. For this, the measures to encourage innovation in Schleswig-Holstein are collected and described. The results are very heterogeneous, but it also shows an impressive range. Among many positive measures, mainly relating to the promotion of existing development projects, it is striking that in the field of stimulation, ie Initiation of innovation processes, a further need exists. In these processes, companies should be guided straight there, to apply new products or processes.

9.1 Promoting innovation in Schleswig-Holstein

Innovation policy in Schleswig-Holstein is regarded as an important focal point, financially supported by various direct and indirect measures. The measures are mainly summarized in the economic development program and aim to promote innovation and infrastructure projects and to increase the innovation capacity in the country. Concrete measures to stimulate or to initiate the open innovation processes are not explicitly included in this program.

The economic development program brings together the Schleswig-Holstein's economic and regional policy funding for the years 2007 - 2013. The program is divided into four priorities. The defined objective of Priority 1 is to strengthen knowledge and innovation. Schleswig-Holstein supports projects that aim to increase the innovation capacity of companies (especially SMEs) and to improve knowledge transfer between academia and industry.

Against the background of increasingly shorter development cycles of products and services and the global competition, the performance of the Regional Innovation System (RIS) for the competitiveness of the regions in Schleswig-Holstein in the long term will be of great importance.

RIS is defined as a geographically concentrated network of companies, research and educational institutions with close and varied linkages along the value chain.

Enterprises within a RIS share a common regional resource pool, consisting, for example from suppliers, service providers, universities, research institutions and further education and training institutions.

This association of actors depends on conditions and infrastructures that are shaped and created by the state actors.

The state of Schleswig-Holstein uses for the stimulation of innovation different instruments to make a direct contribution to the strengthening of knowledge and innovation in the region. These instruments are divided into three areas for action:

Action 1

The funding opportunities are focused in particular to the field of science systems. Supported will be the construction of a R&D infrastructure, the scientific profile and the transfer of scientific know-how for the utilization in the business sector.

Special cooperation and networking between academia and industry, the strengthening of contract research and the protection and creation of new R&D jobs are to be supported.

Within action 1, the following concrete activities are:

- 1.1 Construction of R & D infrastructure
Funding infrastructure projects that lead to the establishment of new facilities will be stimulated, just like the extension and strengthening of existing institutions. As a recipients, all public research institutions such as universities, colleges and non-university institutions in Schleswig-Holstein are encouraged.
- 1.2 integration of science and economy
The program supports the establishment of appropriate thematic network structures. Recipients of grants may be universities and other public research and transfer facilities
- 1.3 Promotion of joint projects
Projects will be funded that will provide the technical and scientific requirements for new products, processes or services and create the discipline of cross-system solutions. The incentives are established to improve in particular the regional structures, economic conditions and living conditions and promote innovation. Recipients are universities or public research or transfer institutions, which forms a alliance based on a cooperative agreement with at least two independent companies, of which at least one company is a SME.
- 1.4 Promotion of centers of excellence
The promotion includes specialized or interdisciplinary centers of excellence as service centers for joint research and development with companies, training, marketing and public relations. Key elements here are to increase cooperation between science and industry and the measurable benefits to the company through own product development. Funding will be provided to universities and other public research and transfer facilities.

Action 2

The focus here is on the promotion of profession education and training infrastructure and the improvement of the training provision as well as technology and business incubators. In particular settlements of enterprises and entrepreneurs from the promising fields of technology and improving the skills of the workforce will be encouraged.

Within action 2, there are the following concrete measures:

- 1 Development of technology and business incubators
Promoted will be the establishment or expansion of technology and business incubators (research, telematics, technology, business incubators). These centers provide small companies, primarily start-ups and young companies, temporary accommodation and shared services.
- 2 Increasing scientific training
Promoted will be the development of scientific training in a business-oriented environment. The focus is on building infrastructures that lead to a strengthening of the knowledge transfer from universities and educational institutions into companies.

This may include for example networks of companies and institutions with tasks of scientific training which develop and implement new forms of knowledge transfer.

3 Promotion of profession education centers and training facilities

Promoting the modernization of profession education centers (investment in construction, renovation and equipment). Personnel and material costs are not subsidized.

Action 3

Knowledge and innovation are encouraged in the Schleswig-Holstein companies also provide incentives to establish or strengthen R & D activities. Incentives of this action are explicitly directed on the development and introduction of environmental innovations. Innovations, especially directed to the conservation of resources in SMEs will be supported. Within action 3, the following specific measures are in place:

1 Promotion of operational innovation in SMEs

Funded will be innovative projects of industrial research and precompetitive development and consulting projects under research and development projects, that support the implementation into innovative products, processes or services. Eligible applicants are small and medium-sized companies with headquarters or a permanent establishment in Schleswig-Holstein.

2 Promotion of environmental innovations

Eligible are particular projects that optimize the operational use of materials that serve a better recording / measurement of environmental impacts by new measurement techniques and equipment, reduce energy consumption of products and production processes, for recycling use of renewable resources and organic residues lead recovery operation test for waste and projects that the introduction of environmental management are offensive to the target.

Eligible are companies with headquarters or permanent establishment in Schleswig-Holstein.

3 Construction of innovation assistants

The action supports the recruitment of graduates from colleges and universities in socially insured employment for innovation projects and innovation processes. These may be the qualifying degree at the time the application is submitted no more than five years.

Employment are eligible to make necessary because of the job requirements in the field of research and development, innovation projects, innovation processes and the application of new technologies, the use of high school graduates

Eligible applicants are small and medium-sized commercial enterprises and the professions with a seat or permanent establishment in Schleswig-Holstein.

With these measures differentiated tools to encourage innovation are available in Schleswig-Holstein. Due to the different target groups and objectives of the support measures the different areas of the regional innovation system are addressed. A special focus on the chemistry does not occur.

9.2 Stimulation and promotion of innovation – the players

In addition to financial support opportunities in Schleswig-Holstein other approaches to support and stimulate innovation are available. The activities of the various institutions are part of an effort to initiate innovations in different sectors of the economy, they can be understood as a part of the national innovation policy.

Economic Development and Technology Transfer Corporation of Schleswig-Holstein (WTSH)

The WTSH is the central institution of economic development in Schleswig-Holstein and is supported by the Schleswig-Holstein, the Chamber of Commerce and the universities. As a "one-stop agency" WTSH support companies who conduct, expand, or re-record their business at their location. The WTSH helps companies, in turning ideas into innovations and exploiting their potential. Their focus is

on small and medium enterprises.

The WTSH manages the bulk of business-related stimulation programs in Schleswig-Holstein, aiming the stimulating and encouraging of innovation. In addition, other measures to encourage innovation and individual innovation consulting and operational innovation audits are available.

The innovation consultants are technology experts with years of professional experience. They assist companies in analyzing, developing and implementing innovative projects, up to the presentation of a total financing. They inform about industry-related developments and intellectual property rights. Integrated into regional, national and international networks the innovation consultants are as intermediaries between industry, academia and politics.

With the innovation audit WTSH provides a comprehensive, systematic analysis of the innovation capability of enterprises. The result shows the status quo of innovation management in the company, resulting into critical success factors, recommendations and an action plan to strengthen the innovation and performance.

Innovation Club Schleswig-Holstein

In order to give companies the opportunity to share their experiences on innovation, mutual learning, new ideas to get through presentations from experts and to make contact with selected partners from business, politics and society, the innovation-club of the Schleswig-Holstein was founded by WTSH and ID Tutor (Division of Walter Werk Kiel GmbH).

The club operates for its member companies a platform for all aspects of corporate innovation from R&D on marketing to business management optimization. The original, by WTSH funded, Innovation Working Group was incorporated into the Innovation Club.

The purpose of the Innovation Club is according to the statutes the organization and implementation of a forum for innovative enterprises in Schleswig-Holstein. This is achieved in particular by conducting regular meetings with the objectives to exchange experiences among the companies, opportunities for contact with business partners, politics and society, and dissemination of information by external and internal experts.

University of Luebeck (FHL)

The FHL is actively supporting the exchange of knowledge and technology transfer, it sees itself as an innovative provider of the regional economy. For the efficient implementation of research and transfer projects are within the FHL three organizations are available:

- FHL Research and FHL Research-GmbH: Application-specific external funding and contract research;
- FHL Project GMBH: Technical development services, increase productivity consulting services and Qualification programs;
- Center for Entrepreneurship and management: Start-up support

Regarding to the project-oriented service provision the transfer institutions using the expertise and technical facilities of the University of Luebeck in the form of a matrix organization. The connection between the University of Lübeck and the business sectors of the economy takes place in sectoral networks. Through close cooperation, the competitiveness of companies through an innovation-oriented research and Service spectrum to be strengthened.

In a framework of events, the FHL offers lectures and information about open innovation. The events are aimed for students and managers.

9.3 Cluster policy in Schleswig-Holstein

Against the background of increasing competition between regions, improving the Schleswig-Holstein clusters play a crucial role. The implemented cluster policy in Schleswig-Holstein (2004) is still a relatively new instrument in the promotion arena in the country. In a socio-economic analysis ten clusters and competence centers have been identified in the country. A chemical cluster is not yet formally established but a chemical cluster to establish further activities and funding priority in Schleswig-Holstein is under construction.

The networking of the actors is seen as an important factor in increasing the competitiveness of Schleswig-Holstein and flanked the regional structures for the exchange of knowledge and technology transfer, by building trust in the network of dedicated players. This allows the synergies of regional R&D activities and activities of the regional technology transfer, without being organized into regional networks or cluster structures, produce much worse. Schleswig-Holstein funds in recent years the networking and development of cluster structures in industries and technologies, with particular growth potential.

Outcomes to be achieved with a corresponding promotion are the creation and intensification of existing networks, to mature in the ideal case to powerful and independent cluster structures of national significance. Networks are stimulating the building of trust, resulting at the enterprise level to a reduction in transaction costs, if long-term cooperation structures between the regional actors in the networks are constituted. This is one way to increase the speed of innovation and to accelerate the exploitation of innovations into marketable products, processes and services.

The structural efficiency is achieved through the strengthening of cooperative industry structures as the basis for the emergence of cluster structures and an increase in employment in those industries that have benefited from the promotion. Unlike the employment structure, the quality of cluster structures and networks are difficult to identify and appears rather by whether broaden sector-oriented, regional value chains, deepen and develop internationally competitive.

To develop the goal-performance cluster structures in Schleswig-Holstein, has so far been achieved in individual thematic areas, in others they are still pending. Since cluster structures provide an ideal setting for open innovation processes, targeted to stimulate specific areas and to accompany their development, is this an important condition for strengthening the innovative power of the country.

9.4 Approaches of open innovation in enterprises

In the context of individual activities to stimulate innovation in companies were also open innovation approaches addressed. These activities were isolated and sporadic, a systematic development of open innovation in companies associated with competence measures for national / cluster internal dissemination of knowledge about open innovation processes are not yet apparent. Starting points for greater use and dissemination of open innovation methods in companies are offered by such as the existing promotion programs. Experience in the field of open innovation, which are available in the scientific field (eg ZBW idea competition) should be used specifically..

Below are three examples presented of open innovation initiatives organized in or by companies:

- Workshop OPEN INNOVATION - Initiative of the Helmholtz Centre in Geesthacht (Centre for material and coastal research) and the WTSH

This workshop series of three events is about picking up focused methods, to enhance them, by using the so-called Blue Ocean methodology, and to concrete them by examples.

Behind the Blue Ocean methodology is the idea that successful companies are not oriented in competition, but they try to find their own innovative ways to define new markets and to open them - the so-called Blue Ocean. These are so far untouched markets, which have little or no competition. Successful innovations are therefore rarely based on technological innovations, but rather on the new alignment of the current overall concept. This series of workshops addressed to all entrepreneurs who are looking for new ideas and in principle willing to start innovative processes in an open group of partners, employees, customers and people from different work areas.

- **InTra-Net Innovation - INTERREG 4 A Projekt involving Schleswig-Holstein**
 As part of the Interreg project-WP: *Growth through entrepreneurship and economic cooperation* e.g. the relationship between clusters and innovation capacity of a region is considered in more detail. The internationalization of clusters is seen as one of the most important driving forces for innovation, competitiveness, growth and job creation in a region. The project aims to strengthen the interaction of innovation and internationalization between clusters in the Interreg 4A-Region. In this case is the ultimate goal, to create a specialized region of growth beyond the borders away, that act under global conditions and can compete. The project focuses on specific areas, but also includes cluster of cross-sector technologies (ICT, robotics, mechatronics and other Cross-sectional technologies) in order to promote innovative cross-cluster projects.
- **Open Innovation Contest for Plastic Extrusion - Reifenhäuser GmbH & Co. KG Maschinenfabrik, Troisdorf**
 With an innovation contest for students Reifenhäuser was looking for the best idea for Plastic Extrusion. Unlike previous competitions in the sector, the Reifenhäuser Innovation Contest as an online-based open competition has been created. An online community was created in the plastic extrusion, offering the offspring a possibility, in an open innovation process, to exchange ideas and to network. A platform was created where the submitted ideas could be published and further be developed and where others get inspired to involved. Target group of the innovation contest were students and especially the students of technical courses, such as mechanical engineering, plastics engineering and process engineering.

9.5 Suggestions for strengthening of innovation culture and to stimulate open innovation

Establishment of the cluster chemistry

The chemical cluster should be formally established and strongly anchored in the Schleswig-Holstein cluster policy. The creation of a permanent structure expresses the political will to intensify cooperation in the field of chemistry and enables the bundling of skills and an appreciation of the regional innovation system. As the central point of contact for companies in the chemical industry and research institutions open innovation processes can be initiated more easily and coordinated with the innovation support programs in Schleswig-Holstein. By setting up workshops on open innovation in the chemical industry / SMEs can thus be made the first steps to stimulate chemical-specific innovation projects. Possible activities include cluster chemistry:

- Working groups of different partners for the optimization of processes / products along the value chain for the identification of open innovation approaches;
- Sharing best practices with other clusters (see InTra-Net Innovation);
- Expansion of cooperation with the Association of Chemical Industry (" *Verband der Chemischen Industrie*");
- Expansion of cooperation in the region of Lower Elbe (with Hamburg and Lower Saxony).

Revitalization of innovation clubs Schleswig-Holstein

The Innovation Club is a well-known and established institution in Schleswig-Holstein. With new services such as design, organization and implementation of conferences, seminars and workshops on topics such as innovation, trend research and idea generation - also known as crowd-sourcing in an open innovation approach - could reach a wider circle of interested parties and stimulate the willingness to innovate. Possible activities of the Innovation Club include:

- Set thematic points
- Form key groups
- stimulation workshops
- Active recruit participants in companies
- Form structures: office, use of the innovation consultant
- Include companies from the region of Lower Elbe (Hamburg and Lower Saxony).

Further development of the project “ *ChemieCampus*” (Chemistry Campus)

The college (“*Volkshochschule*”) Brunsbüttel collaborates with the regional management ChemCoast park at the development corporation Brunsbüttel in a two-year project to provide basic knowledge of the chemical industry for service providers. The project aims to promote cooperation between SMEs and industrial firms in the region and help employees of SMEs to work in chemical companies. Specific training modules were developed to facilitate SMEs and their labor force taking over-contractors work in a chemical plant. The University of Luebeck is a partner and develops e-learning modules for teaching basic knowledge in the field of polymer chemistry.

The existing approaches and structures must be strengthened and supplemented by further topics. There for is the creation of a permanent establishment in a PPP model imaginable. The developed training programs are used for cross-sectorial collaboration / innovation in supplier - customer relationships.

Innovation consultants and innovation auditors as a promoter of open innovation processes

The innovation consultants of WTSH are well networked and known by the company in Schleswig-Holstein. In her role as a mediator between industry, academia and politics, they can help to make new themes and ideas are made known and recorded within the companies in Schleswig-Holstein. Activities with the aim of creating awareness of and openness towards new innovative methods, include:

- Preparation of an information sheet about open innovation and methods for implementation of open innovation processes to stimulate innovation processes;
- organization of workshops and seminars to stimulate innovation at the company level;
- Cross corporate-connections as a basis for creating open innovation processes;
- Institutional and Cross-corporate connections as a basis for creating open innovation processes;
- information for companies about open innovation and methods for implementation of open innovation processes in the framework of an innovation audit.

Innovation assistants as promoter of company open innovation processes inside companies

The graduates of colleges and research universities can transfer the knowledge of open innovation processes and their implementation inside companies. The recruitment and employment of these graduates in the innovation projects / processes is funded.

With the graduates of technical colleges and research universities, their recruitment and employment in the corporate innovation projects / processes promote the knowledge can be worn open innovation processes and their implementation in companies inside. For this potential and active innovation assistants should be trained specific in open Innovation methods. A corresponding program for this could be developed and offered jointly by the (chemical) industry, WTSH and colleges and universities.

EU projects with focus on strengthening innovation culture and innovation system

By participating in EU programs such as InTra-Net Innovation or ChemClust, important insights were gained and practical approaches for improving the culture of innovation and is derived the stimulation of innovation processes in Schleswig-Holstein.

In order to continue the benefits from the experience of highly innovative regions in Europe and to give impetus to the development of measures to improve their innovation systems, relevant economic and innovation support institutions and organizations in Schleswig-Holstein should increase participation in specific EU funding programs. The coordination could be done by the yet to be established cluster chemistry.

9.6 Conclusion

The chemical industry in Schleswig-Holstein is characterized by production units of multinational corporations. The research and development departments are often located at sites of the company headquarters, outside Schleswig-Holstein, with the result that operational research and development in the field of chemistry has no regional significance. The SMEs located in Schleswig-Holstein do develop their products and processes - often without explicit innovation strategies - constantly. There is a strong interest in matters relating to innovation strategies and innovation capability.

The innovation policy of Schleswig-Holstein aims to strengthen and expand the innovation system. For this purpose the business development program for the future provide different measures that support, in addition to the operational projects, also academic institutions and technology transfer and financial advisory structures. This will improve the innovation culture and innovation capability in Schleswig-Holstein and will ultimately stimulate concrete operational innovations. A specific innovation in the field of chemistry is not currently.

In discussions with stakeholders it was concluded that a Innovation culture as a prerequisite for operational innovation in the field of chemistry weakly developed is in Schleswig-Holstein. To stimulate innovation processes - and thus also open innovation processes - the innovation culture and operational innovation capability should be promoted continuously.

For this a number of measures can be implemented aiming to create structures and to stimulate concrete innovation activities. Examples of structure-generating measures are the establishment of cluster chemistry, the revitalization of innovation clubs Schleswig-Holstein and the development of the project "*ChemieCampus*". Parallel to this, the WTSH innovation consultants and auditors and the innovation wizard, as a promoter of operational open innovation processes, initiate more innovation activities. The increased participation in relevant EU projects will incorporate external impulses and experiences into the regional innovation system. This external input has, with regard to the continuous development and improvement of approaches to stimulate innovation processes in Schleswig-Holstein, an important role.

The interlocking of the proposed measures in the chemical sector with the funding programs and structures in Schleswig-Holstein and the implementation and coordination of policies within the practice could be made by a chemical cluster. Appropriate decisions should to be taken at national level in coordination with relevant ministries, WTSH, Chamber of Commerce and scientific institutions. The main task for the chemical cluster would be, related to innovation policy, initially, to work out together with the relevant stakeholders and in coordination with the State a specific implementation plan to improve the innovation capability in the field of chemistry.

The work of the chemical cluster, should be based on the innovation policy of Schleswig-Holstein and be financed by existing programs in Schleswig-Holstein and EU: additional cost Schleswig-Holstein should and could be avoided by a greater focus of resources and – in combination with - a reallocation of existing budgets. A detailed budget must be drawn up.

In combination with with additional costs for the country and should be avoided by narrowing the focus of the center and - by extension - a shift of existing budgets done.

10. Recommendations

As previously mentioned, an open innovation policy stimulates and accelerates innovation (and particularly in the chemical and materials sectors). This fits within the Europe 2020 vision (priority to smart growth – for an economy based on knowledge and innovation) and the thematic approach “flagship initiative” Innovative Europe.

It is important to mention here that Europe 2020 sets out a new framework for economic reform for a new EU policy with respect to structural funds.

ECRN, in a position paper dated 26 October 2011, has stated that one emphasis in the future use of structural funds should be on the additional stimulation of research and innovation by initiating open innovation processes. The present Open Innovation policy aligns with this emphasis.

In practice this means:

- ECRN will have to endorse the Open Chemical Innovation Policy;
- ECRN will present this Open Chemical Innovation Policy to the EU as a valuable instrument for structural funds;
- Perhaps a proposal can be made via ECRN to set up a European demonstration project for the Open Chemical Innovation Policy
- The regions involved should give their own concrete interpretations for Open Chemical Innovation Policy via their own regional and national Cohesion Fund proposals. This will allow the necessary financial resources to be acquired for a regional Open Innovation Chemicals Policy with the associated instruments.

A chart of this approach for the regions have drawn up:

