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Diálogos Setoriais
BRASIL
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Secretaria
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Assistência Técnica ao Projecto de Apoio ao Diálogos Sectoriais UE-Brasil

EuropeAid/126232/C/SER/BR

Projeto executado pelo Consorcio

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***Para: Ministério do Planejamento
Delegação da CE***

MISSÃO

***Consultoria de Curto-Prazo como speaker in the Conference Innovation of
“Arranjos productivos locais”/technical consultant for Technology
Parks/Biotechnology***

***Relatório Final
Fabrizio Conicella***



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1 Mission Objectives

In the context of the project “Diálogos Setoriais Brasil – União Européia” disciplined by Contract n°DCI-ALA/2008/166-193 between the European Commission Delegation to Brazil (hereafter named the Main Contractor and the Contracting Authority) and Soges S.p.A., dated 23 October 2008, Soges S.p.A. has been entrusted with the execution of the project activity:

Technical Assistance within the workshop on the APLs Innovation Project: Consultancy on Technology Parks

whose aim is to achieve the following outputs:

1. *Exchange of knowledge and shared experiences between Brazil and the EU aimed at improving policies for managing innovation within clusters;*
2. *Raise awareness on Brazilian public and private actors about the importance of innovation for the competitiveness of cluster.*

BIOINDUSTRY PARK SILVANO FUMERO SPA¹ has shown to Soges S.p.A. the range of its consultancy activities, presenting as well each professional assigned to each area of Expertise. Particularly BIOINDUSTRY PARK showed skills and experience of the general manager Fabrizio Conicella

After such activity Fabrizio Conicella has been required, in the framework of the above mentioned project to:

1. *prepare a ppp, deliver a lecture and participate in the debate on the topic of technology parks during the seminar in Brasília*
2. *Perform a visit to the companies of the technology parks APL*
3. *prepare a document on technology parks of minimum 10 pages to be delivered after the field mission in Brazil*

2 Duration of the Assignment

The assignment has been realized from 28/06/2010 to 11/7/2010

3 Start, completion and location of the Assignment

The length of the assignment and the places visited are the following ones:

- Brasília: 28/06 – 02/07
- Porto Alegre: 02/07 – 06/07
- Florianópolis: 06/07 – 09/07

4 Activities carried out during the mission

¹ <http://www.bioindustriypark.eu>; <http://www.biopmed.eu>



- 28/06/2010: delivery of the electronic version of the speech for the conference “Inovacao em arranço productivos Locais” and of the paper “Innovative Ecosystems in Biotechnology – from a science Park to an innovative cluster: the Bioindustry Park/bioPmed case”
- 29/06: meeting in the Ministry of development, Industry and foreign trade with D. Marcus Vinicius de Souza, Mr. Rafael Henrique Rodrigues Moreira, Mr. Igor Manhaes Nazareth and Ms. Margarete Gandini. The goal of the meeting was to share the expected results of the conference “Innovative ecosystems in life sciences – from a science park to an innovative cluster: the Bioindustry Park/bioPmed case”, Seminario Internacional Brasil – Uniao Europeia “Inovacao em arranço productivos Locais” Brasilia 30/06 – 1/07 2010 and explain to expert back-ground information about the mission and the project
- 30/06 – 1/07 active participation to the conference “Innovative ecosystems in life sciences – from a science park to an innovative cluster: the Bioindustry Park/bioPmed case”, Seminario Internacional Brasil – Uniao Europeia “Inovacao em arranço productivos Locais” Brasilia 30/06 – 1/07 2010. On the 1th of July delivery of the speech “Innovative ecosystems in life sciences – from a science park to an innovative cluster: the Bioindustry Park/bioPmed case” in the work-shop dedicated to technology park and participation to the round-table.
- 3/07 meetings in Bento Goncalves, together Mr. Mariano Mampieri. The meeting was not planned but by chance I had a discussion with a local entrepreneurs (Mr. Tarcisio Michelin) that was willing to understand if it would be possible to build in a touristic area a “thematic” park in order to improve the attractiveness of the area and the capability to create job places also in connection with the introduction of innovative tools.
- 5/07 meetings at the Pontificia Universidade Católica do Rio Grande do Sul (Pontifical Catholic University of Rio Grande do Sul - PUCRS) and the The Scientific and Technological Park of PUCRS, better known as Tecnopuc. During the meeting has been encountered Prof. R.A. Moschetta, director do Tecnopuc, Prof. L.H.M. Vilcock, coordinator of entrepreneurship center, Dr.ssa M.E.Ritter do Santos, coordinator Technology Transfer Office, Prof. D.M. Johnston Manager Technological Management Agency and Prof. R.M. Bastos, Director Technological management Agency.
- 6/07 meetings at Pontificia Universidade Católica do Rio Grande do Sul with Mr. E.W.A. de Paula (manager of RAIAR incubator), with Mr. R.J. Neto (administrator of Tecnopuc), Prof. D. Santiago Santos (coordinator CPBMF/INCT_TB research lab and responsible of the biotech company “4G” and with O.R. Kronmeyer regional director of ABINEE and coordinator of APL Automacao².
- 7/07 meetings at fundacao CERTI with Mr. L.Carioni (CEO Entrepreneurship Innovation center), A.M. Steinbruch (International Business Office coordinator), A.L.Meira de Oliveira (Responsible Centro de Metrologia e Instrumentacao), A.Lucas (Centro de Metrologia e Instrumentacao), M. Otte (Digital Converge Center), M. Steidle (Centro de Mecaptoelectronica), J.E.A. Fiates (Chief Innovation Officer), C.Quintero Pica (Incubator center for entrepreneurship – Incubation manager), M. Faria da Sà (Project manager), Mrs. L.Morais Kinceler (Governo de estado de Santa Catarina – Centro de socioeconomia e Planejamento Agrícola), Mrs. M.A.Jung Marques (Estado de Santa Catarina, Prefeitura Municipal de Florianopolis, Secretariat Municipal de Ciencia, Tecnologia e Desenvolvimento economico Sustentavel, directora de desenvolvimento Sustentavel) and

² <http://aplautomacao.org>



C.R. De Rolt (Estado de Santa Catarina, prefeitura Municipal de Florianópolis, Secretaria Municipal de Governo, Secretário Municipal de Governo)

- 8/07 meetings with T. Cherighini (Centro Empresarial para laboração de tecnologias Avancadas), R.L. Goncalves (President ACATE), H.S.Dittrich (Vice President ASSEPRO), R. Lossio (entrepreneur ICT), H.B.S. Thiago (President CETIC-SC) and C. Menegazzo (executive Manager Sapiens Park), presentation of the ENI project, of CELTa Incubator, of ACATE Association, of ASSEPRO association, of CETIC APL ans and visit to Sapiens Park and Alpha Parc.

5 Findings

During the **seminar in Brasilia** and during meetings that have been organised “on the fly” based on the speech delivered on “innovative ecosystems” a strong interest has been showed on the concept of value network between actors and on the strategic focus of science parks not simply linked to the phisical facilities but more open to territorial/sectorial development. Legal framework has been frequently outlined as a limit for such approach but after few questions seemed to me that the problem was at the opposite more on the strategic long term mission of science parks, more focused on the completion /management of phisical phacilities and on lacks of focus on the capability to create at local and international level links based on complementaryities/synergies. The interactions between companies and universities during discussions has been frequently outlined as a “problem”.

“Arranjos Productivos Locais” (APL) during the discussion was frequently mentioned as a tool for traditional sectors more that as a general tool for the development. But generally APLs was perceived as a big opportunity for the creation of strategic and durable approaches to the development. The role of innovation in APLs has been discussed: there is a lack of links between universities and companies, particularly SMEs and APLS are sometimes too focused on “manufacturing” than on “innovating” Frequently only medium to big companies have links with R&D centers and innovation is frequently intepreted as process innovation more that product innovation. In such perspective the role of science parks, as innovative hot spots in a particular territory seems strategic.

Governance was frequently mentioned as an issue. Following the APL concept, governance solutions have to include all the actors (industrial associations, trae unions, universities, science parks, etc) that are part of a local cluster of organisations focused around a sector. Such organisations are both public and private but they have different goals. The governance model have to built a win-win environment for each of them linking the need of growth of companies with the need of more job places or more stability or better conditions of work for the terrotory with a general need to perform state of the art research and/or to train students of universities and/or to transfer scientific research to companies. Governance system are both a compensation chamber and a tool to promote the APLs. They could be formal (i.e consortium, foundation, association) or informal (temporary association, forum) In such perspective, in innovative sectors, science parks can act a governance tool or a governance support also if their are not the only governance solution.

In synthesis main problems/issues outlined during discussions are the following ones:



Need of a Cluster orientation: need of a market driven mission vs. a technological driven mission

- Role of innovation in clusters: how to innovate in traditional sectors
- Sustainability as a way to guarantee a long term focus
- Private-Public partnership as an issue: how to built long term PPP solutions. Relations between research-industry-public administration: how to built fruitful and long term relations
- Role of public administration as tool to create positive environments
- Legal environment in order to reduce the “insecurity” of the business environment
- Infrastructure: in some territories infrastructures are a priority
- Specialisation of APLs in order to give a focus and to permit the identification of complementarities vs. APLs too generic
- Fragmentation: need to reduce fragmentation and avoid duplications in activities
- FDI – Foreign direct Investment are a priority but the need of local champions is perceived
- Science parks: condominium approach as a limit. Importance knowledge management: need to implement territorial initiatives in such direction
- Internationalisation of companies: is a strategic issue
- Governance model is an issue and affect the development of the APLs. It has also links with the need of a complementary and supportive legal system but on a more general level has links with the need of a partnership approach in the development of APLs
- Role of science parks in APLs development: they are hot spot of innovation, they are a territorial asset, they attract FDI and they can act as a bridge between universities and companies. They can also act as a governance tool for the innovative APLs together with entrepreneurial/industrial association and Universities

Opportunity of direct collaborations has been shortly discussed with Instituto Euvaldo Lodi – IEL NRMG in order to exchange best practices, develop common initiatives focused on reciprocity on supporting innovative SMES.

During the discussions in **Bento Gonçalves** some issues such as the involvement of private entrepreneurs in territorial development initiatives has been discussed. It is sure that it is not only a problem of public financing but a more general problem of identification of support tools for entrepreneurs. Some european experiences such as the Young Innovative company status in some european countries³ could be of some interest in order to understand if it will be possible to stimulate the growth of new innovative companies in Brasil but also to attract brasilian scientist that are abroad and that are willing to create an innovative company in Brasil. The idea to link such potential initiative to science parks and incubator seems promising.

During the visit to the **Pontifícia Universidade Católica do Rio Grande do Sul**⁴ (PUCRS), Tecnopuc and CERTI foundation several aspects linked to science Park management, technology transfer, support to start-up creation and to the role of science parks in APL development has been discussed. The PUCRS is a private university that has been able in the last 10 years to build a really comprehensive system to exploit scientific results and to attract interest from companies

³ <http://www.yicstatus.com/>, http://www.europabio.org/articles/article_275_EN.pdf;

<http://www.enseignementsup-recherche.gouv.fr/cid5738/le-statut-jeune-entreprise-innovante-jei.html>

⁴ <http://www.pucrs.br>



external to the territory. The system is based on a Technology Transfer center, recently created, a Technology management Agency, focused on the management of collaborative projects with companies, a high-tech incubator, RAIAR, some R&D competence center and the science Parks, TECNUPUC. The university is a philanthropic institution and all the initiatives are managed directly by the university through their professors. The system is focused around 3 main areas: ICT, Health care and energy/environment. The system is acting as a small innovative ecosystem that has contacts with companies external to the science park but has only an indirect involvement in APL creation and development. Nevertheless the system seems really efficient and productive in terms of creation of companies and in terms of attractiveness for external companies. Conceived around 10 years ago the system has been able to create around 2.500 job places attracting ICT companies from abroad (Dell, HP, Microsoft) with the goal to stimulate and imitate the process.

In Florianópolis CERTI foundation⁵, a no-profit organization, has been visited. It has a really impressive approach based on the presence of technology centers focused on applied research, a tool to support entrepreneurship and an incubation system (CELTA) linked to a science and technology park environment (Parqtec ALFA) with focused actions for internationalization (ENI). They have good relations with the local University and they are expanding their activity in a new part of Florianópolis island creating a new science park (Sapiens Park). They are focused on several high-tech areas: Metrology, Mechatronics and automation, Mechatronics, Quality, Digital convergence, Life sciences, etc. ICT seems to be the strongest sector. They are supporting the creation of other science parks in other parts of Brazil and they have branches in Brasília and Manaus for a total of around 300 employees. They already have collaborations with EU institutions and they participate in EU Framework Programme funded projects. They are focused on creation of innovative companies and on applied research activities. Up to now they are working also with multinational corporations and are selling scientific/technical services in all South America.

During the meetings some aspects have been outlined:

- The PUCRS and CERTI approach is not the rule for all universities and Science Parks in Brazil
- The legal system particularly for the part related to the exploitation of scientific results could be improved
- Relations between university and companies are difficult for cultural barriers
- IP culture is lacking in companies
- Risk capital is lacking and companies are usually risk averse: this fact influences the possibility of new and high-tech start-ups to grow and to be part of innovative APLs
- Local Market is frequently perceived as the only market: there is a lack of internationalization culture
- Internationalization support is needed: contacts/relations with foreign counterparts are easy for the university for training and research but are not easy for the science park and the resulting exploitation system
- The Park and the sister organization (e.g. Incubators) can improve the range of added value services to companies e.g. with internationalization support, partner search, technology brokerage etc. The availability of such added value services seems strategic for the APLs development
- University facilities are shared with companies and University departments are delivering scientific services to companies. To have shared facilities (public/private access) is a plus

⁵ <http://www.certi.org.br>



- There is a need to keep talents at home and a to attract skilled human resources
- The ownership of results and the involvement of university professors/scientist in private initiatives (start-ups) are in a legal grey area.
- Partnership with entrepreneurial organisations is a plus but Industrial association sometime are preceiveng Science Parks and R&D centers that works with companies as competitors. As result frequently science parks have not direct involvement or leadership that is in the hands of entrepreneurial/sectorial organisations
- APLs are perceived as a consequence of an already existing situation and not as starting moment of an innovative cluster. This is ok for traditional sectors but is dangerous for innovative sectors. High – Tech sectors need a more flexible and visionary approach
- There is really little knowledge about what other APLs are doing: there is the risk of duplication of efforts
- APLs perceive other APLs as competitors and not as potential and complementary partners
- Usually R&D projects are not linking many actors (one company – one project aproach)
- The management of a cluster is always a challenge: lack of managerial expertises, lack of habits of companies and R&D centers to work togheter
- There are few support for internationalisation and export activities
- There is a choice to make between informal APLs governance and formal (i.e. with a formal cluster managing organisations): the real difference is the capability to manage relations inside the APL but usually the managerial expertises in such direction are scarce.

Regarding APLs we also had a specific meeting with ABINEE i(n Porto Alegre) that manage an automation cluster and with CETIC (In Florianopolis) that is managing an ICT clyster in Santa Caterina. They outlined, from an APL point of view the following general aspects:

- Human resources skilled in supporting companies in writing projects and in project management are a scarce resource. They are expensive and not all the APLs can afford to hire this kind of people. Also Human resources in technological area are lacking. There is a need for focused actions to train people and/or attract talent from other regions/nations.
- APLs have a strategic roadmap but the transformation of a strategy in practical activities is always a challenge. They didn't receive financing from government so the creation of a sound governance model and of a professional service providing is a result of local situation. And follows a low investment aproach. In traditional sectors where the value chain is well known and rigid it is easier that in high-tech sectors where all is more complex. The result is a lighth governance model that has the goal to promote the APLs but has not the resource to offer to the members adde value services.
- APLs have to be composed by an heterogeneity of actors.
- The reduction of fragmentation togheter with a better knowledge of complementary APLs in other part of Brasil are opportunities for the specialisation and for the critical mass.
- Companies don't have a culture of cooperation: it is not common that projects collects diferent companies.
- APLs need more negotiating power vis a vis members of the APLs. In such way the governance model could be based on yearly fee collected by members. Such fees will



be useful to hire professional people able to support companies in their activities. There is a need of “business model” of APLs in order to be self sustaining

- APLs are not simply a collection of actor: they are development tools.
- The real challenge for APLs is to manage multiple relations with all the members: an APLs is more than the simple sum of the members particularly in high tech sectors where we are in presence not of a linear process in the development of new products but of a more complex multidimensional system of actors.
- APLs don't know each other: there is a need for mapping and reciprocal knowledge in order to avoid duplications not useful and stimulate collaborations not only between companies but also between APLs. Maybe the creation of meta-Organisations (meta APL) focused on a specific market/sector or on a specific territory (this is the case of CETIC) will be useful.
- At state level there is the space for specialised (in market and/or technology and/or a territorial area) sub APLS (this is the case of CESTIC and ACATE)
- APLs have to improve services (technical short term training, consultancy, information brokerage, etc) for their members.
- APLs have to include also universities/R&D centers in their governance bodies
- Public tenders can improve the technological advancement of companies requiring state of the art performances for product/services
- There is a strong difficulty in extracting from companies really innovative projects. Companies have not the habit to work in partnership and to be innovative

6 Conclusions:

Brazilian Economy is characterized by different well-developed sectors such as agricultural, mining, manufacturing, and service sectors. In such way Brazil's economy not only is one of the most dynamic in south america but has an interesting orientation not only on the development of the local market but also in export. Since 2003 thanks to the macroeconomic stability Brasil has been in condition to have incremental growth of their GDP. In 2010 the forecast is for a growth of around 5%⁶.

The real challenge of Brazilian economy is to reach a balanced equilibrium between growth of the economy, territorial development and growth of a portfolio of sectors that includes also some high tech area of industrial development. In such direction Science Parks has been identified in the past as one of strategic tools.

ANPROTEC, the national association of organisations that promote innovative companies⁷ states that in the last 22 years has been able to associate 272 organisations, 75 science parks, that represents more or less the 50% of the 400 incubators actives in Brasil. And that accounts for 6.300 innovative companies and 33.000 job places.

The model of development of such organisations seems based generally on a “condominium approach” where the real goal of a science parks and/or incubators is more to “host” a company and not to nurture the growth of the same company. Such model based on physical infrastructures,

⁶For a synthesis of Macroeconomic data on Brazil please see
http://www.theodora.com/wfbcurent/brazil/brazil_economy.html

⁷<http://www.anprotec.org.br>



a managerial structure focused on the management of such infrastructures, some basic support services and financing incentives (direct or indirect) seems oriented more on the attraction of foreign companies (attract the champion strategy) or the support to the growth of already existing promising companies than to the creation of a local market of innovative companies.

We have to outline that the TECNPU and CERTI Foundation model seems absolutely trespassing such simple condominium approach linking in a really modern and dynamic way university, technology transfer, collaborative research and incubation in a unique and really efficient system. But generally for the creation of an innovative ecosystem physical infrastructures, always useful are simply one element of the system: a knowledge support/management and a relation management system are even more useful. It is necessary to link the hosting activity with the capability to identify and pursue exploitation paths for promoting scientific results and innovative companies in order to radicate on the local territory companies that can retain “brains”.

In such perspective the “Arranjos Productivos Locais” (APL) strategy has the advantage, in case of innovative clusters, to leverage potentially on the presence of a science park in a territory in order to build a local cluster of activities also in high tech sectors. But if the concept of APL seems based on the idea that it will be necessary to re-build or represent at local level the entire value chain of a specific sectors in order to assure growth⁸, if we move to high tech sectors, starting from the same definition, it will be necessary to adapt the concept to each specific sectorial situation⁹. What is sure is that in innovative clusters the territorial variable, i.e. the identification of “where” things happens, partially loses its importance. The innovative cluster¹⁰ is a more “flexible” concept that depends from the perception of the different heterogeneous players proximity (territorial but also cultural) with one another and from the existence of reciprocal and systemic relations between the above mentioned players. In other words it is necessary that around a “hot spot” such as a science parks a set of links have to be created inside a specific territory but also towards other complementary and synergistic area of the country and of the world depending if the long term strategy is more oriented to the “local market” (Brasil has more of 180 MI inhabitants) or the continental/world-wide market. Such strategy have to be based not only on technological knowledge but also, and more, on the capability to be market driven i.e to be able to transform/use technology to solve problems through innovative products and services.

Innovative APL to reach such results have to assure not only a complex value chain (or at least have to be specialised in a certain part of such value chain) but they have to offer in perspective, in a direct or indirect way, to local companies the entire spectrum of support institutions and services that can reduce the risk of failure from one side and maximise the return for the territory

⁸In such way the concept seems to be exactly based on the Porter definition of cluster. See <http://www.isc.hbs.edu/econ-clusters.htm>

⁹To demonstrate the complexity of High-tech sectors please see for example the health care case in Brasil : Cesar Gonçalves Neto, Renato Marques « THE BRAZILIAN SYSTEM OF INNOVATION IN BIOTECHNOLOGY: A PRELIMINARY STUDY », J. Technol. Manag. Innov. 2007, Volume 2, Issue 1., P. 55-63, Rahim Rezaie, Sarah E Frew, Stephen M Sammut, Maya R Maliakka, Abdallah S Daar & Peter A Singer « Brazilian health biotech—fostering crosstalk between public and private sectors », NATURE BIOTECHNOLOGY VOLUME 26 NUMBER 6 JUNE 2008, p. 627-644 and Marina Dimova, Andres Mitnik, Paula Suarez-Buitron & Marcos Siqueira « Brazil Biotech Cluster: Minas Gerais. A Cluster Analysis », Microeconomics of Competitiveness, Spring 2009

¹⁰See for example <http://innovationamerica.us/index.php/innovation-daily/5261-five-steps-to-building-a-regional-innovation-ecosystem>, http://socialentrepreneurship.change.org/blog/view/top_trend_2010_2_regional_innovation_ecosystems,



from another point of view. Risk capital, know-how in technology transfer, shared immaterial and material facilities and solutions, etc are some of the territorial asset that could be strategic for the creation of an “innovative ecosystem” or an Inovative APL.

In such perspective a market focus instead than a pure technological focus seems to be important. If we analyse some of the sectors that have been presented in the work-shop (ICT, and Biotechnology particularly) it is clear that a general approach is a limit. It is necessary to focus on some innovative market area with the goal to deliver products and services. In such perspective APLs are in reality multi-technological initiatives. The concept of converging technologies i.e the use of different technologies to identify and develop a product and or a services have to be inserted in the APLs strategy. If APLs are cluster they have to recongise that different sectors require different way to interpret the cluster as a innovative ecosystem.

We have also to remind that also in the european experience there are mainly two typology of clusters:

- The first one is largely a spontaneous, bottom-up development of the manufacturing industry in middle and low tech sectors (mechanics, furnishing, textile and footwear, agroindustry etc.), characterized by a strong specialization of micro and small enterprises along a single supply chain. This model has proved to be successful since the sixties and is largely known in economic literature as “Distretto Industriale” (industrial district) in Italy¹¹. They are characterised by geographical concentrations and sectorial focus.
- The second is the result of a top-down approach adopted by central and local policy makers in order to build cluster dynamics on a deeper technological basis. Since the years 2000 several “technological clusters” have been established, mainly through partnerships between the Ministry of Research, Regions, Universities and Research Centers, business associations etc.. Given this dual cluster approach in Europe, the cluster organization is clearly identifiable in the technology clusters but the industrial districts can sometimes lack a single organization representing the interest of the business community.

It is obvious the the innovative ecosystems concept seems more applicable to such second typology of clusters. Universities and innovatve copanies are overlapping each other in R&D activities in a really flexible and dynamic way. Such process is not linear but it is more based on an orchestration approach. In such context science Parks have to act as system integrator and facilitator.

We have also to say that Technological parks and/or incubators can be used in order to innovate processes or products in traditional sectors. In such perspective the conservatorism based on

¹¹ Marshall A. “Principles of Economics”, MacMillan, 1920, Brusco S. “The Emilian Model: Productive Decentralization and Social Integration”, Cambridge Journal of Economics, 1982 Becattini, G. (1989), Sectors and/or districts: some remarks on the conceptual foundations of industrial economics, in Goodman, E. Bamford, J. and Saynor, P. (Eds), Small Firms and Industrial Districts in Italy, Routledge, London (UK). Becattini, G., (1990). The Marshallian industrial district as a socio-economic notion, in Pyke, F. Becattini, G. and Sengenberger, W. (Eds), Industrial Districts and Inter-firm Co-operation in Italy, International Institute for Labour Studies, Geneva, , p. 167-184. Please take note that the economic theory has identified several typology of cindustrial districts: Markusen, A. (1996), “Sticky places in slippery space: typology of industrial districts”, Economic Geography, Vol. 72 No. 3, pp. 293-313.



cultural barrier is the main challenge with the “normal” risk aversion of “traditional companies”: the shared facilities strategy, the added value services offer, the pilot lab/plants initiatives can be all of interest. But it will be necessary to have a long term strategy, focused and with intermediate milestones.

The long term strategy and the knowledge that there is a “social role” of science parks in an innovative APL have to be recognised. If we move from a “condominium approach” to a value network approach where the management of knowledge and the creation of links is maybe more important than the “simple” location of a company in a science park. In such case the focus in strategy and the return of investment only on a long term basis are a direct consequence. If the long term approach is not an option, the self sustainability and the governance problems cannot be underestimated.

From one side it will be necessary a model that involves directly private and public initiatives (PPP – Private Public Partnership) together in order to identify resources, and from another point of view a PPP approach needs a governance system in order to maintain strategic focus and avoid opportunistic behaviours. In such model public initiatives must assure a positive ecosystem for the growth of innovative private (or private with public involvement) initiatives. It is sure that to involve private actors it will be necessary to identify what could be of “interest” for such actors: probably financing linked directly to APL existence but also added value services such as TT initiatives, export initiatives, quality labeling initiatives, training initiatives, etc. Territorial living labs and regional open innovation initiatives are useful in order to build local innovative communities¹².

The governance issue seems to be a strategic factor: Science parks in such perspective could play a really important role: they can act as “entry point” for the local system reducing transaction costs for companies, they can leverage on their specific asset and expertise in order to activate positive dynamics in the territory, they can act as promotional tool and, being an initiative that has in their DNA both the public initiatives and the involvement of private actors, they can act as representative/compensation chamber. Frequently it will be necessary to build, if not already existing, a parallel organisation that will involve industry association and universities, in order to maintain a difference between the Science Park, that as their own mission, and the cluster managing organisation. But in general science parks can be ideal managing companies.

We think also that frequently science parks can build also strong relations with already existing APLs composed and managed by different organisations such as entrepreneurial or sectorial association. In such cases Science Parks can provide such organisation of technical and managerial skills. In such case the governance model has to assure a fair price for such services and have to be self sustainable. But there is a risk: generalistic science parks cannot be at the frontier in every single sector: they have to focus, from a cluster point of view in 2-3 sectors at maximum. This is another way to distinguish parks with a condominium approach from science and technology parks that can act as focused system integrators.

¹² « Living labs and open innovation policy in regions for the benefit of SMEs », Position paper to the Workshop on 27th January 2010, Brussels Date: 24.01.2010 CO-LLABS Thematic Network www.ami-communities.eu/wiki/CO-LLABS



The governance and managerial problem has been outlined as an issue. It is necessary to outline that in the European experience several regions and countries¹³ have created such governance systems, based on a PPP approach at territorial level. Such systems could be segmented in 3 main groups:

The group 1 can be put in place only with regards to few strategic and macro topics (infrastructures, export promotion tools etc.) but, from the enterprise point of view, it becomes difficult to hold a position and suggest trends and technological priorities that meet the interest of the whole local business community, especially with regards to those clusters integrating many phases of the industry value chain. Science park seems starting from such group in their development.

The group 2 is the most common model of interaction, with the cluster organization playing the role of facilitator and hub to merge complementary skills of production, research and consulting. Here, when projects deal with specific technologies and trends, the number of stakeholders can decrease dramatically and the collective framework vanishes. Such clusters are based on quality instead quantity and the governance system assures fair project building tools to every member of the cluster.

The group 3 is more based on day by day practical interactions and pose the problem of conflicts of interest since the cluster organization, which traditionally has day by day contacts with the enterprises, must act as a selector and a public funds manager, a role which impose a more distant, institutional approach.

For APLs, from information collected, seems more interesting the creation of group 2 governance model that can have positive effects also for internationalisation. But the group 3 seem also of some interest also if more difficult to implement.

The creation of such local ecosystem will be able to attract FDI not only basing such activity on low labour costs, availability of financing or the size internal market but also because foreign companies will be able to find a local ecosystem oriented towards innovation and the growth of the companies that are part of it. In such way it will be possible to "fidelize" such foreign companies building links with local institutions (such as universities) and companies.

At the same time such local innovative ecosystem could be at the basis of meta clusters that will link in a Brazilian value network different territories of the country. Such meta cluster could be based on complementarities between territories and/or specialisations in a particular stage of the value chain of a sector. In such way it will be possible to transform the fragmentation problem in an opportunity of growth. It is sure that such meta clusters require a better reciprocal knowledge between APLs. The same approach can be used to internationalise the local innovative ecosystems building links with complementary areas in Europe and in the rest of the world.

Already existing models such as CEBR¹⁴, some projects such as TACTICS¹⁵ and some "Regions of Knowledge 7FP"¹⁶ projects could inspire local initiatives and can be starting point to study

¹³ AA.VV « Cluster policy in Europe - A brief summary of cluster policies in 31 European countries ». Europe Innova Cluster Mapping Project, Oxford Research AS, January 2008

¹⁴ www.cebr.net

¹⁵ <http://www.proinno-europe.eu/node/19381>



collaborations and synergies. In such way it will be possible to built one to one, one to many and many to many relations. A better reciprocal knowledge is missing. Activities have to be launched in order to create informative entry points cluster observatory¹⁷ and the creation of links between the european cluster Policy Group¹⁸ and a similar Brazilian initiative could be starting points. Some documents already relised seesm of great interest for the development of local brazilian innovative APLs¹⁹: a focused diffusion of such information could be of great interest. A documentation center accessible through internet by APLs could be succesful

In parallel, focused actions that will be targeted in supporting one to one and one to many collaborations between science parks, incubators and clusters could be useful. Such collaborations at the beginning can be focused on the exchange of personnel (short term) in the exchange of best practices and in the study of potential complementarities between science parks and clusters acting in the two area in similar sectors. Focused programs that stimulate the exchange of Technology Transfer managers (short to long term) and PHd students in universities (an european -Brazilian Maries Curie or Erasmus action) can complement such initiatives. In a simil way attraction package for talents can improve the technical skills available in a certain region

Last but not least a focused initiatives on management of science parks based on short term mission, common traning courses and exchange of experiences could be useful to implement a more complex system of activities of Brazilian science parks. At the same time focused supporting/training initiative in cluster management are useful in order to improve governance system and animation/promotion systems of APLs

In general collaboration opportunities has been identified at different levels:

- Company to company level: the possibility to facilitate partner search and company to company common activities seems to be interesting. Participation to EU financing schemes by brasilian companies needs support in order to identify EU partners
- Intermediate actor – Intermediate actor level: science parks and incubators are interested in developing co-incubation schemes and to share/learn/adapt best practices in cluster management , technology transfer and support to start-up and spin-offs development. Pan european networks (such as CEBR) could play a role in offering a wider spectrum of expertises but also one to one cooperation agreement could be at the basis ogif interesting links. Agreement between incubators (soft landing agrements) seems interesting to open european market to brasilian high-tech companies and viceversa.
- Clustert to cluster level: in order to identify more general cooperation opportunities between companies based on complementarities of clusters.
- Identification of a partner in Brazil that can became member of the EEN network to boost technology offer/technology request activity²⁰ seems to be an oportunity
- Stimolous to the participation of EU funded program such as 7Fp seems to ban opportunity

¹⁶ http://ec.europa.eu/research/fp7/index_en.cfm?pg=know

¹⁷ <http://www.clusterobservatory.eu/>

¹⁸ <http://www.proinno-europe.eu/ecpg>

¹⁹ g. AA.VV “Do’s and don’t for biotech cluster development”, Netbiolcue report, 2008

²⁰ http://www.enterprise-europe-network.ec.europa.eu/index_en.htm



- Creation of offices to support internationalisation of Brazilian companies is a must at cluster level

7 Recommendations

- APLs mapping have to be organized in order to identify complementarities and avoid not useful duplication of activities
- Links between complementary APLs have to be identified and supported (critical mass through externalities)
- Science Parks have to be mapped: they are innovation agent in a territory and they can contribute to the diffusion of innovation also in “traditional” sector APLs
- Governance model have to be analysed: APLs have to be based on triple helix governance model
- The creation of local innovative companies is not enough. It is necessary to offer at APL level support for the growth of such company on the global scenario
- Public support for the governance of APLs in order to be more representative of all actors involved could be useful but they have to be linked on a strategic plan and a monitoring system
- The creation of a “young innovative company” regulation linked to the APLs regulation could ameliorate innovation also in traditional sectors
- The creation of offices at territorial level that can matching similar offices at EU level (e.g. EEN) could be useful
- The creation of the category of “Innovative APL” with dedicate rules that will take in account the specificity of high-tech sectors could be useful
- To link a premium in term of tax reduction or other to companies part of APLs could be a way to stimulate cooperation
- It is necessary to prepare APLs and companies inside APLs to be exposed to international competition

Areas of improvement:

- Mapping of APLs to avoid duplication and identify complementarity
- Internationalisation support
- Governance models focused on promotion and self-sustainability that links research, industry and finance together

Opportunities:

- Science parks as governance tool of innovative APLs.
- Creation of local champions as a strategy
- Good capability to implement innovation in product and processes
- Complementarity between aPLs and between APLs and european clusters
- Support to really young innovative companies to became global (local champions)

Potential risks:



- International competition (companies and APLS seems not ready to compete at global level)
- Lack of focus in APLs strategy
- Short-term approach vs. Long term strategies.
- Too much orientation towards FDI vs. local development through local companies
- Duplication of activities
- Competition between territorial actors (e.g. Science Park and Industrial association)

Strengths:

- Commitment of local institutions,
- Strength of universities
- Focused management of science parks
- Big internal market
- Good innovation activity

Weaknesses:

- Lack of Technology transfer activities
- Lack entrepreneurial orientation in universities,
- FDI perceived as champion
- English language knowledge not common
- Risk capital is not common
- A “global vision” of competitiveness is something missing
- Skilled human resources are a scarce resource



Annexes

Innovative Ecosystems in Biotechnology - from a science Park to an innovative cluster: the Bioindustry Park/bioPmed case

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Abstract

It is common opinion that Life sciences and particularly Biotech are an incredible opportunity for growth. Start-ups and academic spin off are strategic assets that are at the core of the complex system that include universities, research institutions, services providers, medium size companies and big multinational corporations. In this context companies are present across Europe but often they are concentrated in existing cluster. Science Parks seems to be a really interesting tool to develop such sector at local level.

At Piemonte level (Italy) and in the Turin area local authorities in the last 15 years launched a framework for the local cluster development, based on the use of European Structural funds and inspired by European guidelines following a 4 line strategy:

- 1. Creation of a focused science park facility*
- 2. Supporting professional training activities (Training pole action)*
- 3. Supporting R&D activities and the relation between academia and industry (Technology platform action)*
- 4. Supporting companies development particularly SMEs and the networking (Innovation pole action)*

In this context Bioindustry Park (www.bioindustrypark.eu) has been conceived with an entrepreneurial approach as a science park with the goal to develop an integrated approach to support the development of the sector at local level, based on the assumption that only the realization of a dedicated value network will permit the start-up of successful companies and the growth. In this way the goal of the Park is to support the development. Attracting companies, creating start-ups, realising technology transfer activities and acting as hub for international networking. Bioindustry Park in this role is acting as a real System Integrator that enables the use of synergies between public and private initiatives. The Park, a private company with public majority has the presence of two major pharma companies (Merck-Serono and Bracco), local

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public administrations and regional financing institutions, is hosting now more than 35 different organizations and is in contact with more of 100 companies, 50 of them are formally committed to boost the cluster bioPmed (www.biopmed.eu). At the same time Bioindustry Park manage directly an R&D lab focused in providing TT services, in delivering scientific services and in realising internal R&D activities. Results of such activities are available for licensing and collaborative research agreement. Third pillar of the company is the capability to support creation of innovative and focused start-ups: the park in the last 5 years has created more of 15 start-ups that has been able to raise more of 7ML euro of private risk capital. Clustering, activity, last but not least, permits to the Park to be a contact point for more than 100 companies located in the Region both for partnering re search at the world level but also to support them in marketing activities. Particularly the international dimension seems important. Biotech sector is global in his nature. Critical mass, systemic approach, internationalisation are key factors.

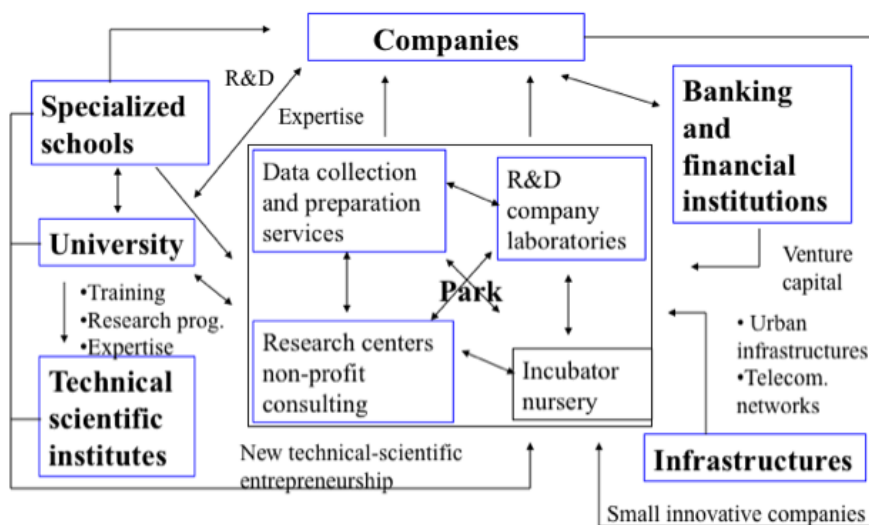
- **Science Parks, cluster and the life sciences sector**

Biotechnology parks are part of the largest category of scientific and technological parks. A first definition, synthetic but extensive, of parks proposed by OCSE, defines them as “Territorial concentrations comprising of contiguous areas in which technology correlated activities are being carried out such as research, development, prototype production, along with all the direct support services. Scientific and technological Parks (or PST) therefore not only are an element of territorial development but also a place of support for start-ups growth and for the development of innovative activities. Inside the parks the presence of University, research laboratories, advance services, risk inclined financial brokers, efficient communication infrastructures and equipped areas for the installation of new enterprises induce a very high level of innovation and dynamism. Furthermore the presence of medium-large company laboratories that can take advantage of economies of scale and learning alongside the small innovative enterprises, more flexible and quick, favour the insertion of new businesses in presence of a large offer of highly qualified human resources, professional expertise and tutoring service, of eventual venture capital, innovative technologies & equipment and the possibility to “exit” the market in an unsuccessful case without creating any major negative impact to the territory.

The “science park system” briefly has in general the following goals:

- Revitalize the productive tissue of SMES, elevating its level competitiveness;
- Promote the birth of new fast growing businesses;
- Enforce the area’s attraction capacity of global enterprises which bring development and technological innovation;
- Exploit research activity results;
- **Support “research world” and “business world” interaction.**

It is the role of the “Incubator”, more precisely a tailor-made institutional location that functions as an activator able to attract and develop the resources, the expertise and system networks. Incubator is capable to start the virtuous circle that begins from technological opportunity to entrepreneurial activity, represents without any doubt one of the most interesting characteristics from the point of view of growth for the High-tech sector companies.



Source: Vagaggini, 1996²²

Such realities structured as mentioned before already exist worldwide²³. They include, case depending, industries from different sectors ranging from Information Technology, electronics, pharmaceutical sectors, to Biotechnology. One common element to all these sectors is their elevated growth rate, high pervasiveness and the transfer potential of innovations to other sectors (“cross fertilization”). Science and technology parks are in general hosting a mix of companies of different sectors but more and more it is possible to find so-called « specialist parks » that concentrate their activities in supporting one industrial sector.

In this context life sciences and biotechnologies represent one of the most interesting areas of activity.

It is necessary to start by a definition “based on economism” in order to fully understand the importance and the impact of the Biotechnology sector. According to some “Biotechnology is selling biology”. This affirmation seems to be fully understood in many countries where by now biotechnologies represent an explicit strategic market bringing some analysts to sustain that the present century shall be named “the biotechnology century”²⁴.

Biotechnology includes a wide range of technologies and procedures that consent the output of new products and highly competitive processes in numerous industrial and agricultural sectors nonetheless in the sanitary sector, permitting at the same time the creation of new opportunities in the diagnostic, biological rehabilitation, production of equipment (biological hardware) and environmental reclamation. “Biotech” products distinguish themselves by their capability of easily enter inside of multidisciplinary “technological solutions” that find applications in several fields.

²²V. Vagaggini « Economia Industriale », Elea, 1996

²³For a world wide situation see the International Association of Scientific Park (<http://www.iaspworld.org>) site.

²⁴Rifkin J. “The Biotech Century” 1998



This pervasiveness, equal if not superior to other technologies such as, information technology²⁵, that has seen a rapid diffusion in the second half of this century of which one must emphasize its complementarity and high potential of integration, constitutes the real strong point of the “biotech” technologies characterising itself as a successful key factor not only for the single enterprise performances but also for the entire economic sector. An indirect consequence of such pervasiveness is a high number of interlaces, with the consequent increase in level of concentration, between the “biotech” “pure” companies and companies of other sectors.

The biotechnology sector has shown in the last few years a striking economic growth in industrialized countries, impacting directly on the quality of life and on the socio-economic development²⁶.

This sector has been characterized by at least three relevant factors: a high techno-scientific content in a rapid and continuous evolution, the close relationship with basic research (therefore with University and other institutions) in which biotechnologies deeply sink their roots and the long length of time necessary to introduce a new product out on the market (period of time which today varies between 5 to 10 years, for almost all sectors of application).

Other fundamental aspects of this sector are the necessities to an effective management of capital and an always more adequate and up to date patent of products and processes.

Talking about the biotechnological sector presupposes knowing its industrial structure. Biotech sector depends in fact on the actual functioning of an innovative “system” that realizes itself through the link between three components, where the proper development of each competent plays a crucial role.

Research

It is the principal source of new ideas that, once developed, can bring to the commercial exploitation of new products or productive processes and/or to their improvement.

It principally includes research carried out in public and private structures, although can involve also industrial research partners. As a rule, research results are used by enterprises only if of economic interest. The main routes followed by research in order to become process and product of innovation are above all the transfer of technology in its different forms and the birth of new enterprises.

Biotechnology specialized enterprises/dedicated Biotech firms

²⁵ From some it is instead indicated from the interrelation between Biotechnologies and Information Technology the true keystone of next century’s development. (cfr. J. Rifkin op.cit)

²⁶For an overview on the biotech sector please see AA.VV “Global Pharmaceuticals, Biotechnology & Life sciences”, Datamonitor, 2009; AA.VV “Beyond Borders – Global Biotechnology Report 2009”, Erns & Young 2009; AA.VV “Life Sciences: performing in the down turn and beyond”, Cap Gemini, 2009; AA.VV “Global Life sciences tools & Services”, Datamonitor, 2010. AA.VV “The future of the Life sciences Industries: Aftermath of the global recession”, Deloitte 2010; AA.VV “Mind to Market: A Global Analysis of University Biotechnology Transfer and Commercialization”. Milken Institute, 2006



The “DBF” appeared to be the most incisive in converting scientific discoveries into services and products with a commercial value. They are of three types essentially:

- developing enterprises: are enterprises proprietary of an idea which are engaged into converting it in a product or service of a precise commercial value. Many of them, in particular medical-healthcare sector, are linked through investments and joint efforts with larger sized enterprises. An action strategy of this type turns out to be of interest also for the large pharmaceutical industries, by the possibility to make use of research and development activity results produced in other centers.
- “integrated activity” enterprises: are enterprises that have invested in research , development, production, marketing and sales. With the exception of new companies sprung up in the diagnostic sector and Amgen, Genentech and Genzyme in the pharmaceutical sector, they are relatively few;
- supplier enterprises: are enterprises that supply equipment, materials and services either for companies which operate strictly in the biotechnology field and for end user companies. This type of firm is becoming always more important because of enterprises needing the use of technologies and services which are not available in house.

All of the following companies can be regrouped in two other macro-categories:

- Established Companies (EC) or Large Diversified Firms (LDF’s): enterprises already operating in a traditional way in various market sectors but which have introduced modern biological technologies inside their enterprise, either as an innovation product element as well as an improvement of ongoing production;
- New Biotechnology Companies (NBC) or Dedicated Biotechnology Firms (DBF): enterprises born to make research or however born to make use of biotechnology offered possibilities, characterized by high scientific content, close ties with basic research and distinct specialization.

End user enterprises and synergistic sectors

This type of enterprise influences the market because it possesses numerous personnel and financial resources along with considerable competencies.

They have the possibility to influence regulation, let alone strong marketing and sales capacities.

They have developed in the last few years (particularly with pharmaceutical) strong links with specialized companies of the sector through alliances, joint-ventures and take-over finalized to access new ideas and products. Many of the biggest end-user companies have internally developed research and development capacities in the biotechnological fields.

It is opportune to emphasize how biotechnology “cross impacts” condition innovation and development also in distant market sectors (Agriculture-Diagnostics; Energy-Environment-Food; Chemical-Equipment-Therapeutics, Biotechnologies-Informatics-



Biomedical, etc.) The so called “converging technologies” seems to be more than a promise. They seem to assure a completely new generation of med-tech solutions.

This “multiplier” effect emphasizes itself even through the analysis²⁷ of links existing between biological, medical research and equipment development in “biodistricts” USA, let alone the cooperation which is established between industrial enterprises of different sectors. The intensity of iterations research-research and research-enterprises and enterprises-enterprises reinforces the capacity of biodistricts to attract further settlements.

For the scope of “biodistricts/biovalleys” development the presence of a nucleus of excellent scientific competences is of central importance along with the presence of the instrumentation sector in which micro-enterprises are strongly present.

The “Biotech System” which develops itself through the connection of the three components Research-Enterprise Biotechnologies specialized – End-user Enterprises suits well the definition of a Virtual/cluster District that consents to set aside the territorial context in order to reach in the aggregation of enterprises and research systems which collaborating, benefit of common services based on the high technology through the virtualization of relations and processes. These concepts will be taken up again in the last part.

In this overall view it clearly appears how the presence of enterprise incubators and science parks, in which the link between the three components is tutored in its start-up phase, and of structures dedicated to technology transfer, can represent a competitive advantage element for an enterprise of this sector.

But Science Parks are not the only dimension where life sciences find a positive environment. The complementary cluster dimension seems at the basis of the life science development. Clusters are not simple industry sectors but are defined as: “Geographic concentrations of interconnected companies, specialised suppliers, services providers, firms in related industries, training institutions and support organisations linked around technologies or end product within a local area or region”²⁸.

But Science parks are playing a really important role in a cluster. They are « sub-clusters » and « hot-spots » that can be at the origin of more impacting regional innovative clusters.

The afore mentioned information makes us understand how when talking about development, the biotech sector has to confront itself with a high number of variables. The European Commission²⁹ has distinguished multiple dimensions that come into play

²⁷The Dynamics of Industrial Clustering – International Comparisons in Computing and Biotechnology, ed. G.M. Peter Swann, Oxford, 1998, see Senker J. (edited by) “Biotechnology and competitive advantage. Europe’s Firms and the US challenge”, Edward Elgar Publishers, Cheltenham (UK), Northampton (MA-USA), 1998

²⁸Michael Porter *Competitive Advantage of Nations* (1990); AA.VV “Do’s and don’ts for biotech cluster development”, 2008

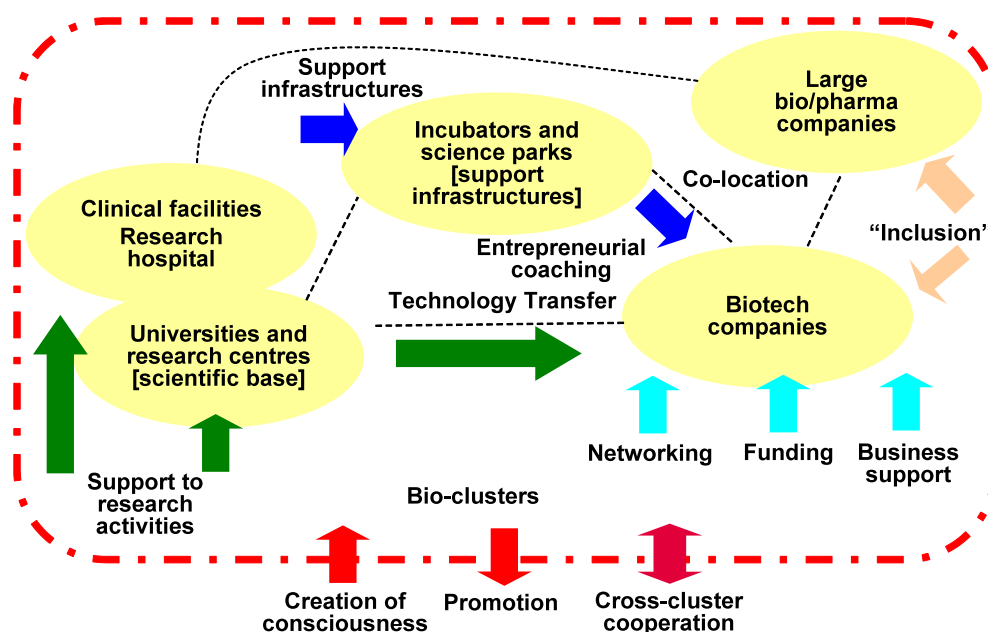
²⁹ European Commission, “Life Science and Biotechnology – A strategy for Europe” COM(2002) 27 Final January 2002, Brussels



at the time in which the problem of which instruments must be activated to favor the growth of this sector is encountered. Briefly, the key elements identified are the following:

1. The presence of a strong scientific base;
2. The capacity to transform scientific research results into innovations;
3. Encounter with society;
4. Harmony with values of which society is the bearer;
5. Adoption of demand oriented solutions through an informed choice;
6. Reliability of scientific instruments on which regulatory boards bases itself;
7. Shared and transparent regulatory principles;
8. Belonging to international networks.

As easily noted these key elements in reality touch multiple aspects such as economic, financial, ethical, political and communicational which are encountered in these terms exclusively at macro economic and continental level.



Source NetBioClue, 2008

Many have concluded with respect to this, that the biotechnological sector can grow following territorial logic and particular aggregations³⁰, based on the cluster concept or

³⁰ Koheler G.A. "Bioindustry: A Description of California's Bioindustry and Summary of the Public Issues Affecting Its Development" California research Bureau, April 1996, Swann P.G.P., Prevezer M., Stout D. (edited by) "The Dynamics of Industrial Clustering - International Comparisons in Computing and Biotechnology" Oxford University Press, 1998, "Les biopoles font bouger l'europe", L'Usine Nouvelle, March 1999, Edginton S.M. "The future belongs to the bioentrepreneur", Nature Biotechnology, Vol 16, 1998, Edginton S.M. "A new Model for bioentrepreneurship", nature Biotechnology, Vol 17, 1999, Dianna Bowles (rapporteur) "Entrepreneurship: networking of Biovalleys in Europe", European Commission, may 1999, AA.VV "Biotechnology cluster" Departement of Trade and



on the one connected in part of Biovalleys in which the previously illustrated aspects can be described and confronted with politics and punctual synergistic instruments.

One must therefore stop for a moment on these two concepts in order to define the reference development model. If for Biovalleys it can be understood as an identified and limited territorial area, on the contrary for clusters defined as “a geographical concentration of enterprises which are linked with one another, specialized suppliers, service distributors, enterprises belonging to linked sectors and institutions connected (for example university, regulation boards, category associations) in particular fields that compete and cooperate”³¹. We have therefore a definition that on one side reminds us of an industrial district³² and of technological district³³, on the other side it differentiates from this by its geographical valence. Talking about clusters in fact the territorial variable, that is the identification of “where” partially loses its importance. The cluster is a “flexible” concept that depends from the perception of the players proximity with one another. This perception varies depending on territories and cultures. The propensity to worker mobility within the territory without having to change address. As an indication it has been proposed here to identify clustering area as an area in which its possible to cover the entire territory in a condensed transfer period. This parameter in a country like USA is really high. In Europe, and particularly in Italy, where the mobility is lower, the same parameter has a lower value and fits with regional or above regional territories.

Identifying clustering at territorial level as one of the sectors developing models consents identifying before hand some dynamics that, if correctly functioning, guarantees the systems auto supplying. The exchange of knowledge, the sharing of shared resources, the presence of research institutes and training are only some of the essential aspects. Clustering however must strictly follow the rules of the game which are demand oriented and can hardly be imposed with a type of top-down approach. With this perception the role of public authorities is to simply guarantee the conditions, the pre-requisites in the shaping and growth of a cluster.

These pre-conditions are configured although as an essential element for every type of “private” and entrepreneurial initiative. We are therefore before key variables that “pre-exist” to the cluster and are of support to its growth³⁴:

Industry - UK, 1999, Breschi S., Lissoni F., Orsenigo L. “Success and failure in the development of Biotechnology clusters: the case of Lombardy” CESPRI, Bocconi University, 2001

³¹ Porter M “The competitive advantage of nations”, The Free Press, 1998

³² Marshall A. “Principles of Economics”, MacMillan, 1920, Beccattini G. “Mercato e forze locali. il Distretto Industriale”, Il Mulino, Bologna, 1987, Brusco S. “The Emilian Model: Productive Decentralization and Social Integration”, Cambridge Journal of Economics, 1982, p. 167-184, Onida F. - Viesti G. - Flazoni A. “I Distretti industriali: crisi o evoluzione?”, EGEA, Milan, 1992, AA.VV. “Innovazione, piccole imprese e distretti industriali - 3° rapporto CNEL/CERIS-CNR” Documenti CNEL n° 7, Roma 1997

³³ Antonelli C. “L’attività innovativa in un distretto tecnologico”, Fondazione Giovanni Agnelli, Turin, 1986, Ciciotti E. “Natalità delle imprese e diffusione delle innovazioni di processo in un distretto tecnologico”, Fondazione Giovanni Agnelli, Turin, 1986, Storper M. “Technological District and International Trade: the limits to globalization in an age of flexible production”, Working Paper UCLA, 1991

³⁴ Allansdottir A., Bonaccorsi A., Gambardella A., Mariani M., Orsenigo L., Pamolli F., Riccaboni M. “Innovation & competitiveness in European biotechnology”, European Commission, Enterprise Papers No. 7, 2002 p. 47 – 59; AA.VV “Biotechnology cluster” Departement of Trade and Industry - UK,



- A relevant scientific base is the on territory presence of universities, research and clinical centers followed by a “critical mass” of researchers
- A dynamic and innovative entrepreneurial culture
- A growing entrepreneurial base especially in high technology sectors with spin-off and start-up
- With environmental conditions that can attract qualified personnel from other territorial areas
- The presence of infrastructures and international links
- The possibility to access venture capital in order to support the activities
- The on territory availability of specialized service distributors and enterprises in correlated sectors
- The on territory availability of qualified manpower
- The on territory availability of support networks and technology transfer
- The existence of public authority, international, national and regional politics and relative financial support structures

In the light of the sector’s own characteristics from the point of view of the enterprise typology and convergence / integration phenomena importance, it is therefore possible to explain the identified variables in a perspective view of strategic respite and of industrial politics beginning with the assumption that “in spite of the tendency towards an ample research internationalization, high technological performances tend to be tied to “home-based”³⁵ research capacity.

- **The Bioindustry Park case**

The **Bioindustry Park Silvano Fumero (BIPCa SpA – Colletterto Giacosa (TO))**³⁶ is located near Torino (Piemonte region – Italy) and has been realized to promote and develop biotechnology research.

It applies to national and foreign companies, small and medium enterprises, that intend to undertake research activities and experimental production in the chemical, pharmaceutical, diagnostic, veterinary, agro-food, cosmetics, bioengineering and information technology. The Park, operating since 1998, hosts along with private enterprises, LIMA (Laboratories for advanced methodologies) managed in close collaboration with the University of Torino and one of the CNR’s research centres specialized in proteomics.

The main areas of interest - molecular biology and biotechnologies, proteomics, chemistry and bioinformatics – are all supported by state-of-the-art scientific apparatus

1999, pag. 18, Pammolli F.,R M. “Geographical cluster in the biotechnology industry” EPRIS working paper, University of Siena, 2001

³⁵ Allansdottir A., Bonaccorsi A., Gambardella A., Mariani M., Orsenico L., Pamolli F., Riccaboni M. “Innovation & competitiveness in European biotechnology”, European Commission, Enterprise Papers No. 7, 2002, p. 2

³⁶ <http://www.bioindustrypark.eu>



and act as a centre for training on analytical and research methodologies and techniques. The facilities and expertise are available for the benefit of the local system (namely to companies), in a way that is strongly pragmatic, operational and highly focused. A synthesis of the core competences for each platform here follows:

- Molecular biology: fusion proteins, transgenic animals, DNA sequencing, analysis of biological processes, monoclonal and polyclonal antibodies, phage display analysis
- Proteomics: purification of proteins and peptides, protein characterisation, protein sequencing, also in partnership with CNR-ISPA
- Chemistry: hi-res NMR, field cycling relaxometry, mass spectrometry, chemical analysis, spectrophotometry, synthesis, computing facilities in partnership with Torino University
- Bioinformatics: parallel calculation, modelling and simulation, « traditional » and innovative applications of bioinformatics.
- Bioanalytics : capability to perform Bioanalytics and Pharmacokinetics services and research activities

The same technological platform are also used for the realization of so called “exploitation project” i.e. technology transfer and internal R &D projects.

Along with the scientific services the Park guarantees all support services and a series of advanced services relative to the search of financing for research activities, to the technology transfer, to patents, etc. An important activity is lastly made in order to support the start-up of innovative enterprises through the search of “business angel” and also to the managerial type of backing.

In this context is active the Discovery initiative managed by Bioindustry Park del Canavese in strong partnership with Eporgen Venture and with the support of Piemonte regional authorities.

The Discovery project therefore consists of three core phases: selection of deserving scientific projects, location of the company in the park Bioincubator that also provides equipment, general services, tutoring services, shared facilities and access to Bioindustry Park Lab and instrumentations and, something completely new on the Italian scene, investment in seed capital by non-institutional bodies that the park has been able to involve in the scheme.

From June 2004 to November 2009 through roadshows and promotional activities around 20 start-ups has been created and more of over 7 million Euros of seed capital/business angels capital as been raised in this initiative. Part of those money has been provided by a special independent seed capital company, Eporgen Venture, being set up by a group of informal investors. Eporgen Venture has been created with the support of Bioindustry Park involving local investors and business angels. The goal is to assure financial resources for the first 24 - 36 months of development of start-ups providing also managerial support.

Discovery is one of the few examples of integrated approach to the start-up of innovative companies in biotech linking physical facilities, tutoring support, access to scientific know-how and instrumentation and seed capital funds.

Alongside to these direct actions towards the single enterprises more generic support activities exist tending to the realisation of a series of research infrastructures that



optimize the exploitation of the resources, the individuation of the research areas and the use of human capital, in order to be able to obtain in the end concrete results on productive development point view.

The overall goal is to guarantee an environment which is favourable to the entrepreneurial development and to the transfer of research results to the productive world. This tenancy, taking place through out the world brought to the proliferation of “Biovalleys” or « cluster »³⁷ that are territorial areas where the so-called new “Bioentrepreneur” can find a group of environmental elements which are positive and favourable to their development. The presence of these “Biovalleys” or “Cluster” and

³⁷ On clusters and biocluster please see: “Les biopoles font bouger l’Europe”, L’Usine Nouvelle, March 1999, Edginton S.M. “The future belongs to the bioentrepreneur”, nature Biotechnology, Vol 16, 1998, Edginton S.M. “A new Model for bioentrepreneurship”, nature Biotechnology, Vol 17, 1999, Dianna Bowles (rapporteur) “Entrepreneurship: networking of Biovalleys in Europe”, European Commission, may 1999 AA.VV “Do’s and don’t for biotech cluster development”, Netbiolcue report, 2008; Best, M., 1990, The new competition: institutions of industrial restructuring, Cambridge, Harvard University Press; Roelandt, Hertog, 1999, Cluster Analysis and Cluster- Based Policy, Paris, OECD; Humphrey, J., Schmitz, H., 2000 Governance and Upgrading: Linking Industrial Cluster and Global Value Chain Research, IDS Working Papers, n.120; Krugman, P., 1991, Geography and Trade, Cambridge, MIT Press; Marshall, A., 1990, Industry and Trade, London, Macmillian; Schmitz, H., 1995, Collective efficiency: Growth path for small-scale industry, in Journal of Development Studies, 1995, Vol. 31, No. 4, pp. 529-566; Sengenberger, W, Loveman, G.W., Piore, M. J., 1990, the re-emergence of small enterprises: industrial restructuring in industrialised countries, Geneva, ILO UNIDO, 1995, Principles for Promoting Clusters & Networks of SMEs, Small and Medium Enterprises Programme, Discussion Paper, No. 1; UNIDO, 1999, SME Cluster and Network Development in Developing Countries: the Experience of UNIDO, Private Sector Development Branch, Working Paper No. 2; European commission “Innovation clusters in Europe”, Pro Inno europe Paper, n° 5, 2006; European Commission “The concept of clusters and cluster polizie and their role for competitiveness and innovation” Pro INNO Europe Paper n° 9, 2008; European commission “Regional research Intensive cluster and science Parks”, 2008; BIOTECHNOLOGY CLUSTERS : Report of a team led by Lord Sainsbury, Minister for Science. London :Department of Trade and Industry, 1999; Cooke Ph “Regional Innovation Systems: General Findings and Some New Evidence from Biotechnology Clusters”, Journal of Technology Transfer, 27, 133-145, 2002; O. Sölvell. [et al.] The cluster Initiative Greenbook. Stockholm : Ivory Tower, 2003; V. Chiesa, D. chiaroni “Industrial Clusters In Biotechnology: Driving Forces, Development Processes And Management Practices”, Imperial College Press, 2005; Rinaldi A. “More than the sum of their parts?”, EMBO Rep. 2006 February; 7(2): 133-136; Sölvell “Clusters Balancing evolutionary and constructive forces”, Ivory Tower Publishing, 2008; AA.VV Les « clusters » américains : cartographie, enseignements, perspectives et opportunités pour les pôles de compétitivité français Étude réalisée par le cabinet Alcimed pour le compte de la Direction générale des Entreprises (DGE) FRANCE, Octobre 2008: AA.VV “CLUSTERS MONDIAUX : Regards croisés sur la théorie et la réalité des clusters. Identification et cartographie des principaux clusters internationaux.”, Institut d’Aménagement et d’Urbanisme de la Région d’Ile-de-France, Etude réalisée pour le compte du Conseil Régional d’Ile-de-France. Janvier 2008; AA.VV “Building biocluster” NATURE REVIEWS DRUG DISCOVERY, 2007, VOL 6; NUMBER 4, pages 327-327; M. Fischer “Determination of Critical Success Factors for the Development of Biotechnology Clusters”, Green (on line), 2006; A.M.R. “How clusters can encourage entrepreneurship and venture creation. Reasons and Advantages”, Int entre. Manag, J (2008) 4: 315-329; AA.VV “Regional Research Intensive clusters and Science Parks”, European commission, 2007; J. Potter – G. Miranda “Clusters, innovation and entrepreneurship Local Economic and Employment Development (Program), Organisation for Economic Co-operation and Development, 2009; G. Lindqvist “Disentangling Clusters, Agglomeration and Proximity Effects”, Dissertation for the Degree of Doctor of Philosophy, Ph.D Stockholm School of Economics 2009;



their networking probably represents the key element to the development of this sector in Europe.

Results of the first 10 years of life of Bioindustry Park are confirming that it is possible to develop an high tech sector through a science park approach: around 23 different companies, 3 research centers/universities and different association, with a total of around 500 workers are located in the Park area. Other 4 companies with around 300 workers are located in a 10 kilometres distance from the Park. All those organisation except 2 have located in the area after the creation of the science Park

- **bioPmed innovative cluster**

The last component of the system is the bioPmed initiative³⁸. bioPmed, the Regione Piemonte innovation cluster on biotech & medtech, has been launched in May 2009. According to the EU recommendations, it is a grouping of independent undertakings — innovative start-ups, small, medium and large undertakings as well as research organisations — operating in a particular sector and region and designed to stimulate innovative activity by promoting intensive interactions, sharing of facilities and exchange of knowledge and expertise and by contributing effectively to technology transfer, networking and information dissemination among the undertakings in the cluster.

The group is led by the Bioindustry Park del Canavese and gathers around 50 companies, research centres and academic institutions (including the 3 Universities of the region), who signed an agreement to create, build, support and animate the local cluster. More than 100 companies are active in the region (www.piemontebiosciences.org) in biotech and medtech, while Piemonte one of the most important Italian region in terms of biotech companies and the first in terms of biotech start-ups created³⁹.

In the first phase, the innovation cluster will focus on 4 technological domains

- Cell & molecular therapies
- New imaging and diagnostic technologies
- New technologies for pharmaceutical research, diagnostic, analysis and biomedical
- New technologies for non-health related applications

Applied to five main thematic areas:

- Oncology

³⁸ www.biopmed.eu; www.piemontebiosciences.org

³⁹ AA.VV – edited by Assobiotec-Farminindustria « Ernst & Young Report on Biotechnology in Italy – BioIn Italy report 2010 », 2010



- Cardiovascular
- Auto-immune diseases
- Other pathologies with high medical need
- Non-health related applications

The different sub sectors are clustered around more general activity area focused on human health care.

As stated, the aim of the innovation cluster is to favour, thanks to regional support, the development of the local biotech and medtech system through animation, networking, project building and project labelisation, as well as through sharing knowledge and services and positioning the entire system at international level. Schematically it will focus on

- Collect and interpret technological needs of the companies, with the aim of providing suggestions for the local support actions to innovation and R&D
- Favour the sharing of knowledge and the creation of a critical mass of investment on specific development paths and the inter-sector knowledge and technology transfer
- Favour the investments and the shared use of infrastructures and novel intangibles
- Favour the mobility of human resources and the attraction of talented people
- Favour the participation of companies into international networks and communities
- Favour the companies in accessing the sources of scientific and technological knowledge of industrial interest
- Provide access to specialised and high added value services
- Favour the access of SMEs to European Community funds and programmes
- Collect and interpret the training needs of the companies, adapting and better using the available tools and giving support in implementing new ones
- Favour entrepreneurship, especially among young researchers
- Favour the internationalisation process
- Attracting new investments in the region

The initiative is lead by Bioindustry Park del Canavese science park, that, since its creation worked as system integrator for the development of life sciences in the region. Of course, all the activities will be carried out in cooperation with strong and reliable local actors, such as CEIP Piemonte for internationalisation, ALPS EEN and Patlib network, while synergies will be exploited with other local R&D and innovation support initiatives. We can mention the Innovative technology platforms, special research funds for Universities working with companies on innovative fields such as molecular



imaging, stem cells for regenerative medicine, immuno-oncology and product innovation for diseases with an high medical need. Or else the initiative to support innovation for SMEs, which sustains projects and investments in research and innovation, in order to favour the production of goods with high technological content and help the growth of SMEs or some more the IFTS pole (HTE course), a training pole specialised in life sciences.

But the cluster is also a way to position the territorial system at international level. Fifteen international clusters and organisations – among which ADEBAG – Grenoble (FR), BioAlps – Geneva (CH), BioCAT – Barcelona (ES), BioM - Munich (DE), CEBR - Brussels (BE), ERBI – Cambridge (UK), Genopole – Evry (F), MVA – Copenhagen (DK), RAD Biomed Tel Aviv (ISR), Technopark - Heidelberg (DE), The Technology Centre of New Jersey - North Brunswick – NJ (USA), FABA, Asian federation of Biotech Association, Bionegev and Bay Bio Suzhou (Shanghai – China) already gave their support to the initiative and are ready to follow and to sustain its development process.

Moreover 3 EU projects have been successfully submitted: Bio-Alpine Cluster (Interreg) will set up a network of biotech and medtech clusters in the Alpine Space, creating the most favourable conditions to support the development of the companies and stimulating their innovation process through cooperation. The other project, Bio-CT – Biotechnology Common Tools (Regions of Knowledge), will define a joint action plan that allows every actor involved in early stage development, to benefit from shared resources that can quicken the process from Scientific Proof of Concept to Industrial Proof of Concept, making it more efficient and economically viable. Last but not least the ABCEurope project, that involves more of 14 partners, is committed in the development of common services across different clusters. Moreover, Bioindustry Park is strongly connected with key sector-based players at international level and is part of the Steering Committee of CEBR⁴⁰, the Council of European Bio-Regions.

All these elements will contribute to the cluster to develop, together with the most dynamic world-class bioregions using a partnership strategy based on specialisation in some therapeutic niches and innovative technologies that will support the growth of the local companies and the interactions between them and Universities.