

## CLOE – Clusters Linked Over Europe

Market Intelligence Study:

Competitive positioning  
of the best European clusters  
in transport vibrations and acoustics

CLOE deliverable supplied by :

Lyon Chamber of Commerce and Industry



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# Competitive positioning of the best European clusters in transport vibrations and acoustics

## 1. CONTEXT OF THE STUDY

### 1.1. Definition of the research scope

This study focuses on a progressing competence in the transport industries. Not yet identified as a market on its own, it is based on the phenomena and problematic of acoustics, vibrations and vibro-acoustic. English speakers usually use for this definition the expression “NVH” for Noise, Vibration and Harshness.

Thus, in order to simplify the writing of this article, we will use it in the whole document, and, even if the vibro-acoustic phenomena are not all included in the English definition, we have decided to associate them to it.

We will talk about these entire phenomena, are they related to mechanical, aerodynamic, structural aspects etc..., if they find their origin within the assembled and equipped transport case.

The industries concerned by this research are those of transport in general:

- cars /trucks and industrial vehicles,
- aeronautics and space,
- rail transport,
- ships.

Each year, these industries invest more money in NVH as a leading conception, a mean of correction of the undesired phenomena and a marketing argument.

## 1.2. Aims and results of the research

The knowledge about NVH is weak, in Europe as well as in the USA. However, the recent evolution of this competence has created a market on its own that is not studied and controlled yet. A traditional market survey would be contested by experts and they would not pretend to a real representation of reality.

On the other hand, answering to the economic specification research of the European region through a “cluster” policy, the real need for information control takes more in consideration the control of competitive environments with regard to clusters than those with regard to a precise and exaggerated knowledge of an entity.

The level of competition will exist basically between territories (sometimes named as “centres” or “clusters” in this text) even if those are defined by the identification of the different actors composing them.

Thus, the analyses made in this research may have two levels of understanding: one of them is territorial in order to position each region and its development policies and the other one is particular to the companies (and others) that will find keys of comprehension about their partners’ or their competitors’ positioning and behavior.

The goals of this study are double:

- In a first time, it aims to identify the different relevant NVH clusters or centres in Europe, and to describe them through their industrial, university and research actors. This first step has for goal to locate the strength, the weaknesses and the influential areas of the competitor clusters.
- In a second time, we are looking for positioning all these centres in a chart of segmentation.

The study was conducted from June 2005 to December 2006.

## 1.3. Methodology

### 1.3.1. *The theoretical principles*

The study has been made using the theoretical bases developed by Professor M. Porter from the Harvard Business School.

The main reference books are “The Competitive Advantage of the Nations” (1992) and “On Competition” (1999) for their marketing approach and their territory development strategy, about (between others) the thematic of clusters.

The adaptations of these theoretical elements to the concrete application of the research had been developed by Lyon Chamber of Commerce and Industry.

### *1.3.2. The method*

On the contrary to the classical research approaches, our decision had been to give more dynamism and sense to a photographic representation of skills.

Thus, the research took place following 4 steps:

- The identification and validation of NVH competence centres; the identification of each centre's actors.
- The definition of the main comparison criteria between the centres' actors.
- The characterization of the competitiveness determinants in each centre.
- The centres' segmentation and positioning.

In order to fulfill this aim, it is necessary to gather around and within the realization of this research some experts of this industry and also a representative panel of the actors present on the NVH field.

That is why a main group of 10 persons from the industry, laboratories and clients has met and has been appealed regularly. Its role was to establish a first economic overview of the industry, to discuss the new elements gathered and analyzed and to lead the action process.

Occasionally, extra persons had met the group after each main step to discuss more generally the conclusions.

Thus, the results of the research are presented as the following:

- A set of personal details card for each actor and/or cluster where meet the characterization elements selected by the working group. ( Like card that have been developed during 'CLUES' European project)
- Several maps. These maps are edited from a sociological tool allowing to show (if it is necessary) the relative weight of each actor in the industry, with regard to the selected elements.

The exploitation of the information represented by graphs is particularly appreciated for its readability and its comprehension. This has allowed the participants to react more easily on the data shown and to analyze collectively the line up data.

The characterization of the centres' profiles has been made following a 5 indicator analysis chart. This chart has simplified the identification of factors that make the difference between centres. It has been composed of concerned industries, key competences, readability and attractiveness, and typology of local industries.

## 2. THE KEY ELEMENTS

### 2.1. Historical of a growing economy.

Historically, NVH has never been considered as a market before the 2000's. It was a technical know-how for solving the mechanical problems at the origin of noise, vibration, fatigue of machines, motors, vehicles.

During the 60's and 70's, the expertise has raised, led by the strategic importance of underwater navy. Some huge centres created in this period perpetuate an activity that became ISVR in Southampton or DOUA laboratory in Lyon. The return on investment was nil, only some laboratories live on orders made by the State and the Army from Occidental countries.

The 80's and 90's marked an industrial turning point for NVH: the automobile industry integrated it and had a strong pace of knowledge development. The stakes were still of technological nature: to make lower the noise of a compartment, to understand better the structural weakness to understand the phenomenon of transmission, to limit the vibrations made by a unit etc.

The rapid rise of the thematic during the 90 caused the apparition of new laboratories and new actors on the market. In spite of a lack of available reliable data in the documents, the savings made during this period of time were enough to allow half of the new born actors to still be present on the market nowadays.

The NVH market is structuring itself since the beginning of the new millennium. Some data appear; from a few hundred millions for the global market to one billion dollar in 2005, with a growth rate above 10%.

The main element is the apprehension of the NVH. They are not anymore technical, they become marketing argument.

### 2.2. Marketing tendencies

Different elements show a sharp evolution of NVH in the last 10 years:

- A strong market structure: In Europe, we notice few important rapprochements and movements of juridical and financial structures. On one side, there is the explosion of companies as LMS, Bruel & Kjaer, global leaders on their sectors that go on their growth on a remarkable way and structuring themselves as a consequence of this. The size and the strategic positioning of these concerns cause too the apparition of spin-off on forsaken or non appreciated market niches.

Some other leaders have different evolutions: 01-dB and Metravib merged after several transfers and acquisitions. Campana-Varenne, one of the leader

in the 80's, has been divided in two parts, one purchased by 01-dB and the other one gave to dB Vib located in Rhone Alps, France.

These few examples are illustrations of big transformations reflecting the economic sector maturation in organization and structuring.

- Taking in account the upstream problematic: at the origin, NVH were the imperfections of a process that we tried to solve after the conception. Nowadays, the engineering and design departments take in consideration earlier the NVH requirements and the development of tools in order to make the NVH part of the whole elements of cars and machinery conception. This phenomenon is recent: whereas the NVH congresses were reserved to scientific experts and researchers, since 2000 some industrial congresses (mainly automobile ones) about NVH had been developed in Europe and in the USA. Their thematic is revealing industrial preoccupations that are giving up technical aspects to obvious marketing preoccupations. If we take as example the thematic developed for the Styrian Noise Vibration and Harshness Congress organized in Graz since 2001, we can notice that:
  - ❖ the 2001 congress was dedicated to “sound engineering and design” as well as to “psycho acoustics” as answer to the buyers waiting (clients)
  - ❖ the 2003 congress was about the internal sound as parameter for brand characterization;
  - ❖ the 2005 congress highlighted the necessity for creating the vehicle brand through aspects on interior comfort and the noise made by the vehicle during its use.
  - ❖ the 2007 congress will be about the NVH excellence to answer to the customer requirements.

The thematic progression is representative of changes in NVH buying behaviors and of the new orientation taken by industrials to meet those trends.

It is also important to notice that nowadays, the transport industry meets all the rules established by the European Union. It even goes further. Thus, the money invested, the observed tendency comes from a real marketing war about sound and noise in which enter the main transport brands, mainly automobile ones.

Within the 2005 specifications of the biggest European manufacturers, the NVH exigencies are part of the 5 main points to analyze, where as before 2000 they were not even part of the long list of constraints to fulfill.

### 3. POSITIONING OF EUROPEAN NVH CENTRES

The next paragraphs summarize the principal stages carried out to characterize centres and actors and to establish a strategic positioning for each cluster.

#### 3.1. Cartography

The identification of the European centres was performed in an empirical way thanks to two complementary approaches:

- Localization of the business connections of the working group members. The co-education of typologies present in this group made it possible to have a global vision of the principal European actors, their site and their real relevance.
- The recurring presence of certain actors at the time of the principal NVH manifestations in Europe and in the world.

Following this first identification of the actors, the principal territories of NVH competences were selected. A complement of study was held from June to September 2005 in order to supplement the list of actors and to join together the elements of characterizations of each one of these actors and the centres. Following this complement of studies, a meeting made possible to determine the relevance of each centre and to add others of them, appearing then. In June 2005, only 38 European actors had been listed at the time of the working group, currently 12 centres gather more than 100 actors, all qualified.

Information was collected within the traditional supports of communication (Web site, booklets, available press reviews, conferences, etc.) and supplemented at personalized meetings by phone and mail. However, it was difficult to obtain an exhaustive result on all the selected criteria. The charts highlight for each centre the number and the name of the companies, research centres and clients (major) present.

#### 3.2. Factors of differentiation

The factors of differentiation of a centre lie as well in related industry as in its structural environment. If Porter defines well the interest of both these elements, the list of criteria to qualify them is long and it is once again necessary to select some. Thus, for connected industry, we will be interested in the industrial and economic history of the centres on which the NVH can find its origin or its future.

In order to facilitate the analysis of the results according to the quoted criteria, the territories have been profiled according to 4 large vectors:

- their sectors of NVH predilection (Automobile, Aeronautics, Boats, Railway).
- their key competences: technical: the centre has many technical or technological instruments; research: the centre has a strong base of research; engineering and design department: the actors of the centres are from

engineering and design department in materials, the centre has a strong expertise in this topic.




- their international visibility.
- their attractivity.

### 3.3. Charts and comments

The centres identified and studied at the time of this study are located at around 2h by car of the following cities:

- Barcelona,
- Berlin,
- Copenhagen,
- Graz,
- Louvain,
- Lyon,
- Milan
- Southampton,
- Stockholm,
- Turin
- Valence
- Paris

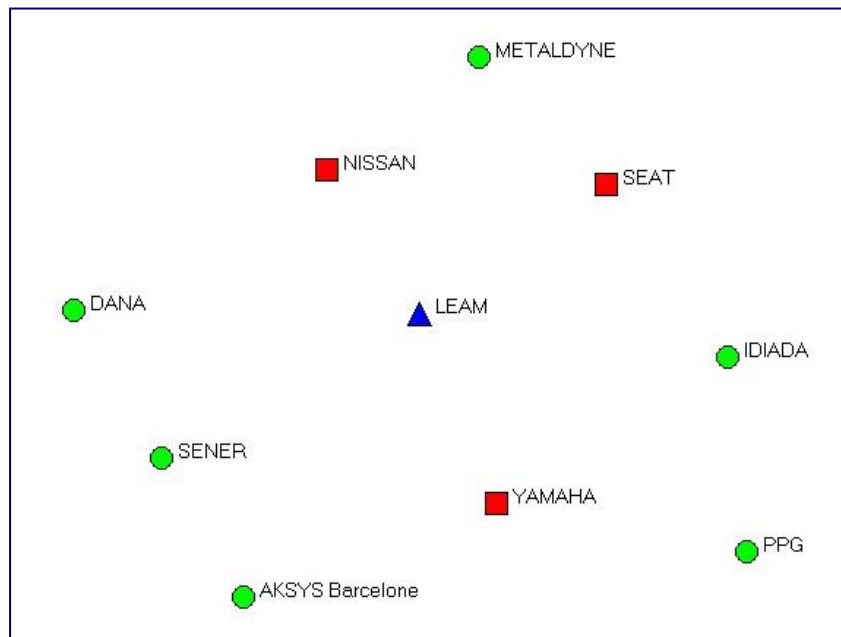
#### Mappings description:

-  Laboratories
-  SME's
-  Key accounts

3.3.1. Barcelona

CLUSTER
Sectors : Automobile
Key Competences : Technologic platform & materials (subcontracting)
Visibility : low
Attractiveness : very good

Local Industries
Automotive
Textile
Ship building
Bank services



Comments :

This area is very strongly marked by a past of subcontracting. The companies present are often centres of production stripped of engineering and design department or research centres.

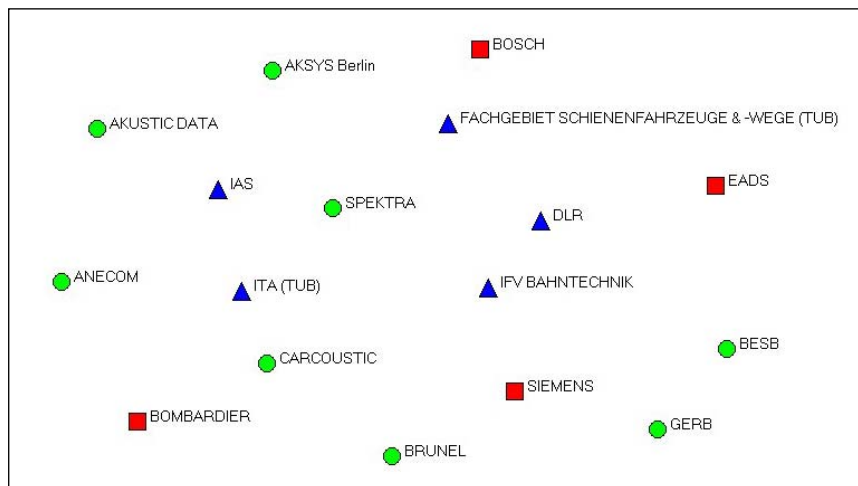
The main part of the relations moves towards the clients present locally. One finds here great names of the car industry and subcontracting, without inevitably identifying relevant actors in the development of the NVH know-how, aside the laboratory LEAM, more and more present in the European relations.

Finally, if Barcelona is relatively quoted like a NVH centre, it is essentially for IDIDA, joint-venture between Applus and the government of Catalonia to equip the area with a “great measuring instrument of outside acoustics” where the large vehicles can also carry out tests.

The favorable climatic conditions (heat reducing the auditive impact) and the framework of study take part in the success of this platform.

3.3.2. Berlin

CLUSTER	Local Industries
Sectors : Railway transport (aeronautic) Key Competences : Research & Engineering Visibility : average Attractiveness : good	Transport & logistics Environment ind.



Comments :

It has been a great historical place of NVH until the Seventies thanks to the notoriety of its professors. It seemed that the NVH competence weakened in this area. Although the examination shows that its competences have been focused in the field of railway for 15 years. It is the most important trust, engineering and design departments and laboratories on this activity. Enjoying this historical recognition, Berlin seems to be underestimated in term of competence and must undoubtedly work on its legibility. However, its geographical positioning, its accessibility and the importance of its infrastructure make this area very gravitational.

It will be also noted that Berlin strongly communicates on "Transport and Logistics" industry which is regarded as one of these vectors of economic development, but also social development in the field of urban transport. However, the financial statement of the territory is not good; perhaps we will be able to note a weakening in political support of this sector in the future.

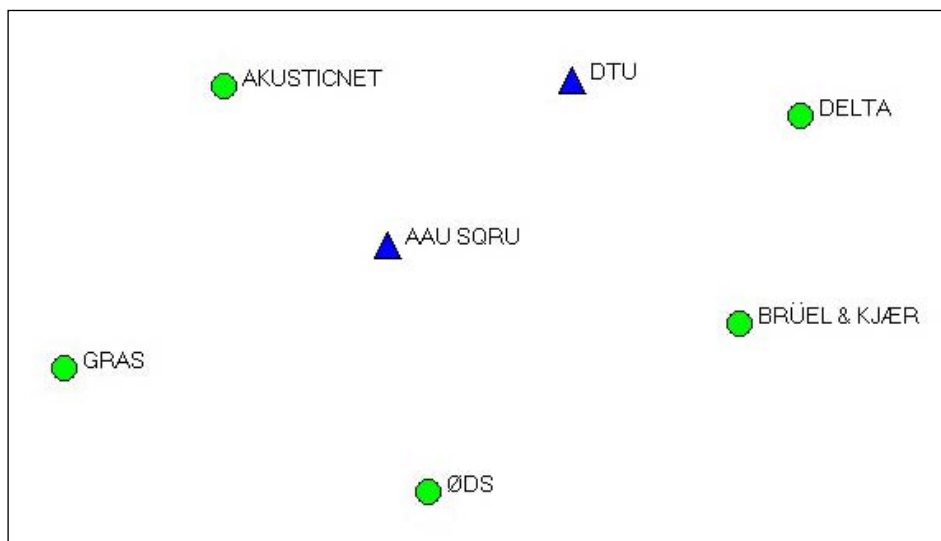
In this centre, the university plays a role as much of formation than of research. The various centres are very connected. By its strategic position, it accommodates DLR (German ONERA), some strategic clients and is positioned like one of the major interlocutors in the design of the new standards.

In a smaller proportion, aeronautics is also very well represented and has an obvious potential.

3.3.3. *Copenhagen*

CLUSTER
Sectors : non defined
Key Competences : Measure & Research (sound quality)
Visibility : average
Attractiveness : low

Local Industries
Chemistry - Oil
Metallurgy



Comments :

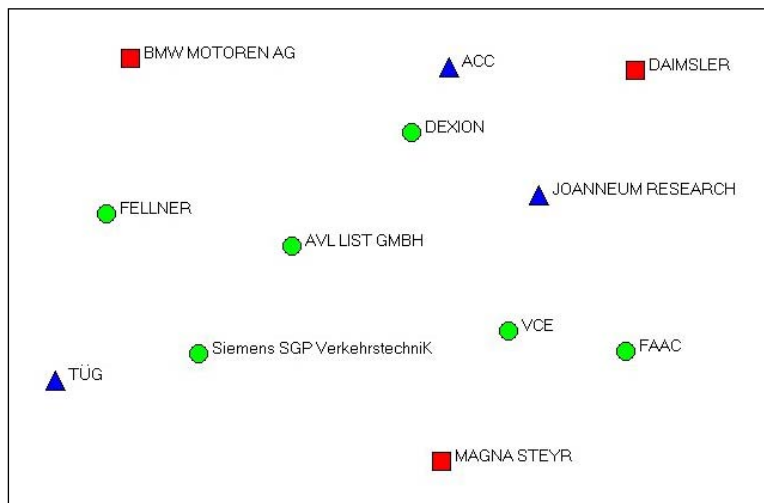
Undoubtedly it is the atypical pole of the competence, without industrial history extremely around the car or aeronautics. It is characterized by the presence of Bruel & Kjaer, the most famous of the European companies in the field of NVH instrumentation.

This speciality is reinforced by the competing installation of GRAS (its founder comes from B&K.) NVH skills of this area are nourished essentially by particularly sensitive industry constraints for certain vibratory purpose or defect of structure: chemistry and oil drilling. Thus, the little of engineering and design departments present are focused on these concerns, and undoubtedly, the supremacy of their systems of measurement comes from the difficult conditions imposed by these branches of industry.

Aside the two principal companies, few interactions take place with the others. Only DTU is readable thanks to these aspects of research. It is consequently an area with multiple competences, slightly dense, where one comes only for particular relations.

### 3.3.4. Graz

CLUSTER	Local Industries
Sectors : Automotive Key Competences : Engineering & technological platform Visibility : very high Attractiveness : average	Automotive Chemistry Textile & Paper Mecanics & Metallurgy



#### Comments :

Area of strong subcontracting for the German motor and car industry, it knew how to develop original companies of co-production: Magna-Steyr or Daimler. The presence of AVL on its territory, leader in NVH tests and designs, supports a strong economic animation around this field.

In 1999, AVL, Magna Steyr and TUG created an association "Acoustic Competence Center", technical centre of service and research, which organizes itself an international industrial conference, Styrian NVH congress. This congress gathers every two years the principal Germanic actors as well as increasingly stronger Latin & Asian populations. Approximately 150 people meet themselves, exchanging on the automobile concerns essentially.

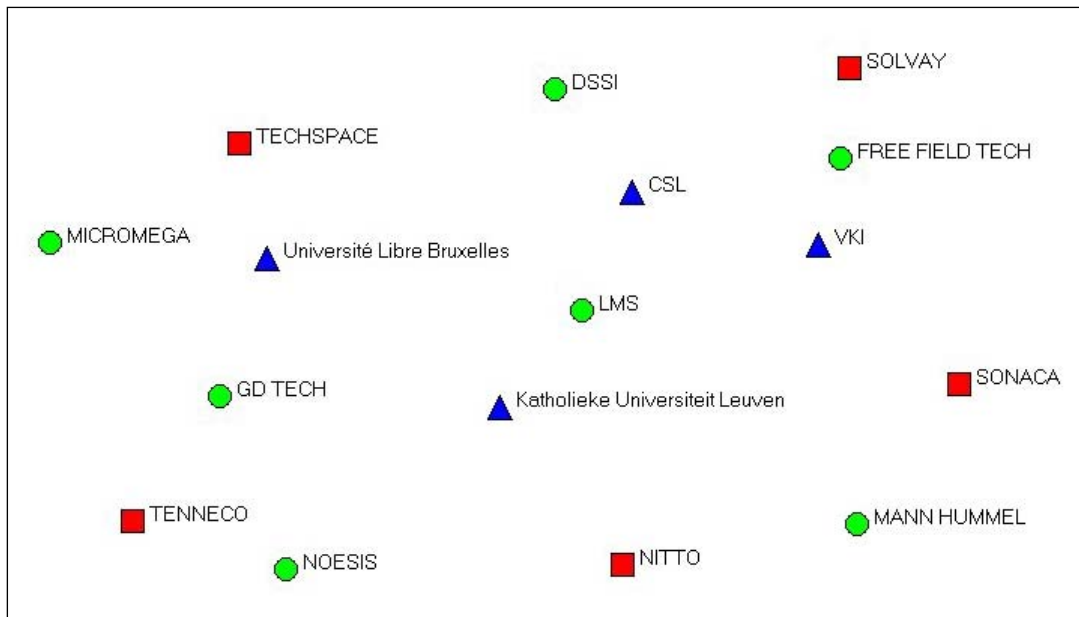
It is the most important NVH event at the present time. Americans from SAE-International have just approached to organize the 2006 session in Graz and the following one in the USA.

The equipment available around ACC is remarkable. Few industrialists have such a complete range. This offer enables them to attract many contracts of services and studies, but does not seem to support the installation or the creation of new companies. Their visibility is very good.

3.3.5. *Louvain Belgium*

CLUSTER
Sectors : Aeronautics / Spatial (& Automotive)
Key Competences : Engineering & Research
Visibility : very good
Attractiveness : very good

Local Industries
Automotive & Aerospace
Metals & materials
Electronics & Electrotechnics
Mecanics & Mecatronic



Comments :

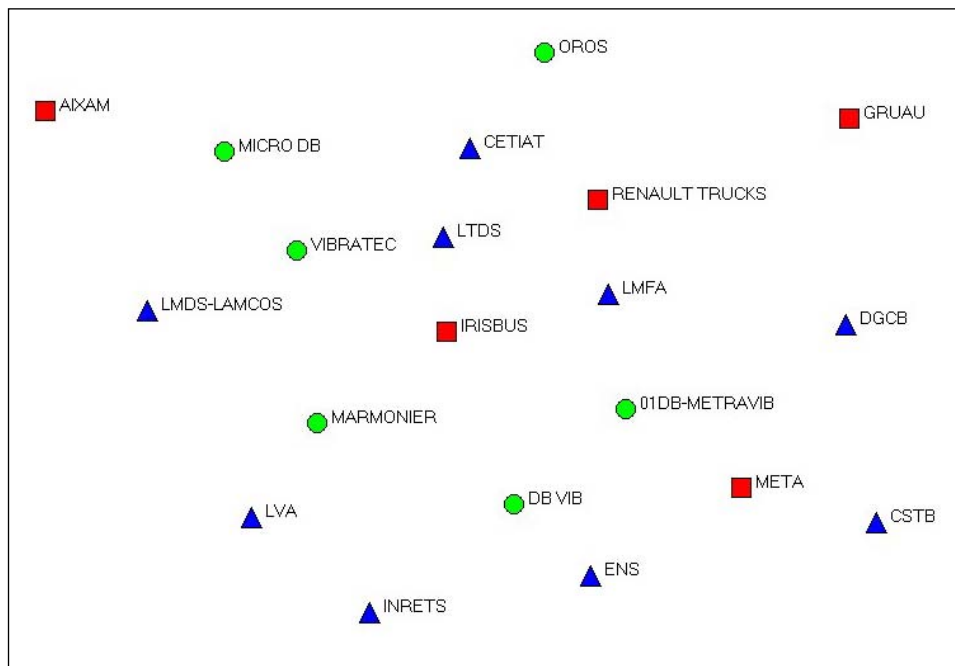
It is a very dense territory in term of actors and typologies. A world leader, LMS, is also present and allows raising the visibility of this pole. Here, it is the aeronautics which seems to carry the rise of the NVH, even if good automobile skills are present. The KU Leuven, University of Louvain, radiates largely in Europe and appears as a research centre that cannot be avoided. LMS and Micromega come from this university. The territory concerned by these actors is relatively small and profits from an historical competition: the Flemish area against the Walloon one. Consequently, there are competitor repetitions: this internal competition often enabled one of those areas to reach a critical mass of business.

Since several years, aeronautics takes advantage from a strong Walloon policy of support through the animation of cluster. This axes of economic development undoubtedly supports the reinforcement of certain competences, such the NVH, in order to personalize the territory and to reinforce its visibility. This territory is extremely well located and accessible for Europe and benefits from all the modern industrial services.

3.3.6. Rhone Alps, France (Cluster LARA-NVH)

CLUSTER
Sectors : Aeronautics & Automotive
Key Competences : Engineering & Research
Visibility : good
Attractiveness : good

Local Industries
Automotive
Textile & Chemistry
Electronics & Mecanics
Microelectronic



Comments :

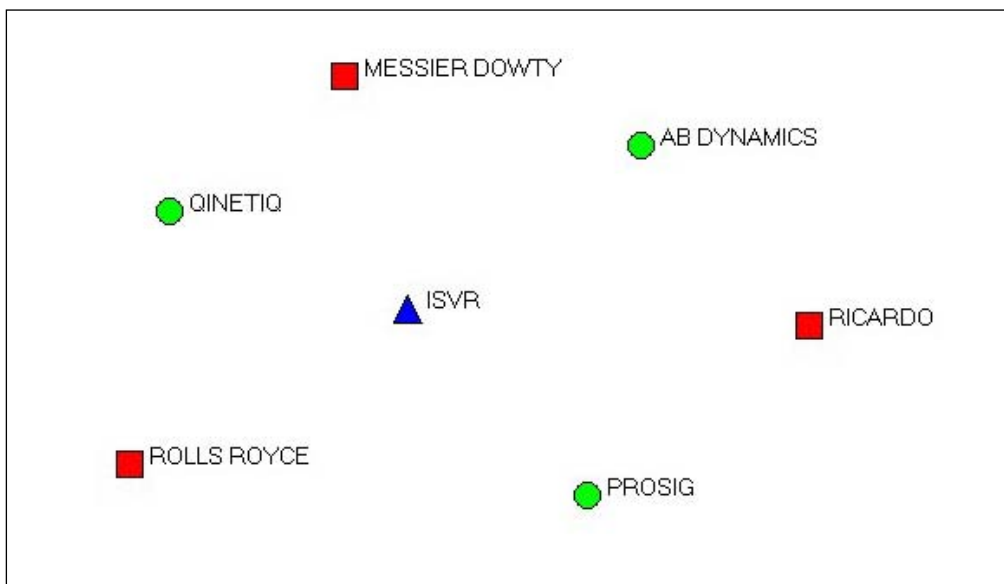
Supported by a strong automobile and mechanical history, this territory was one of the cradles of vibroacoustic. In fact the laboratories are at the origin of the NVH. During years, they knew how to spread their knowledge within starting up or already existing structures, and to create an important set of recognized industrial competences, in spite of the medium total size of companies. Thus the principal activities are the research and the engineering and design departments. The area benefits from a good legibility, drawn by the laboratories, and from a rather important economic infrastructure as well in term of accessibility as of services to the companies.

Its sectors of specialization are the car and aeronautics, among other things for the aerodynamic phenomena. However, other local industries are more and more interested in the NVH as consumers or as providers (micro-electronics, etc.).

This area concentrates more than 50% of the French actors in NVH, but is however deprived of important tools for the moment.

3.3.7. *Southampton, United Kingdom*

CLUSTER	Local Industries
Sectors : Aeronautics & Automotive Key Competences : Engineering Visibility : very good Attractiveness : weak	Transport & communication Portuary activities Energy Water



Comments :

The most recognized area, Southampton benefits above all from the presence of ISVR, principal cradle of acoustics in Europe. This laboratory works on the most complete panel in the fields of acoustics, including NVH. It is an essential place for all the students or researchers who wish to make a career. This international attraction shows a very small spreading on the English territory but the creation of some companies all around the world.

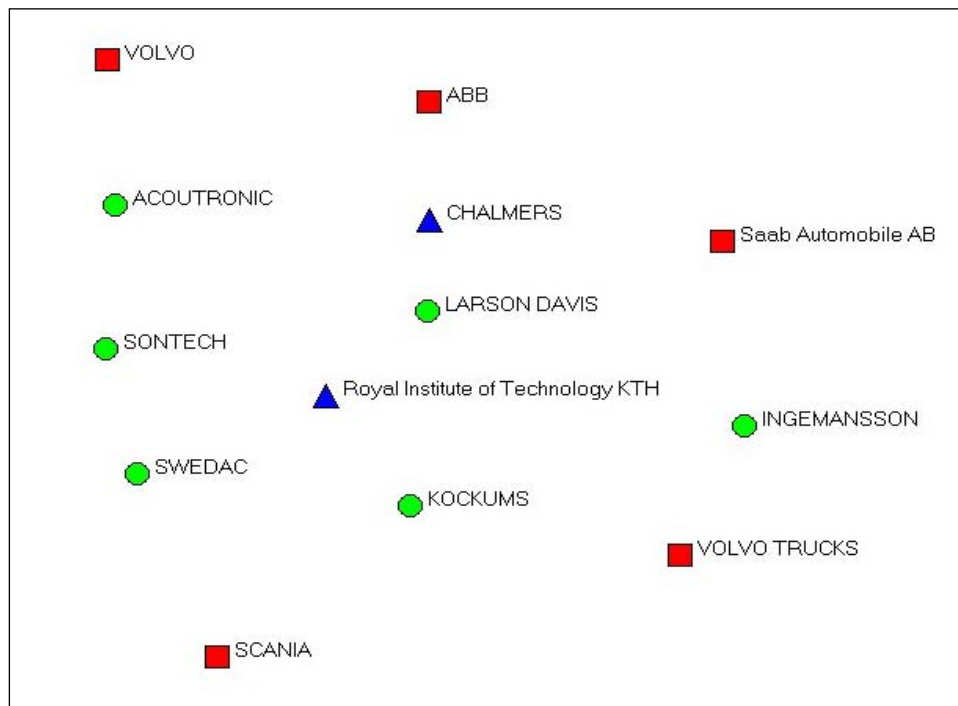
Thus, the territory poor in industrial actors is deprived of competitors on the research field (cannibalized by the ISVR). Only some large historical equipment suppliers are present and take an active part in the supremacy of ISVR, while contributing very largely to the financing of their professors and their theses of research. Despite this, we would note a decrease compared to the past.

Lastly, the weak industrialization of this area, the little of synergy available with other present industries and the distance of the decision-making centres generate a low attraction for this area.

3.3.8. *Stockholm, Sweden*

CLUSTER
Sectors : Aeronautics / Trucks
Key Competences : Material & Research
Visibility : average
Attractiveness : average

Local Industries
Automotive
Machinery
Paper
Musics



Comments :

This vast territory (exceptionally, its whole actors are at approximately 3h by car) is focused on industrial subcontracting, strongly related to the car and the truck. Once again, the laboratories created the fame of the territory while taking an active part in the European programs and the various world demonstrations.

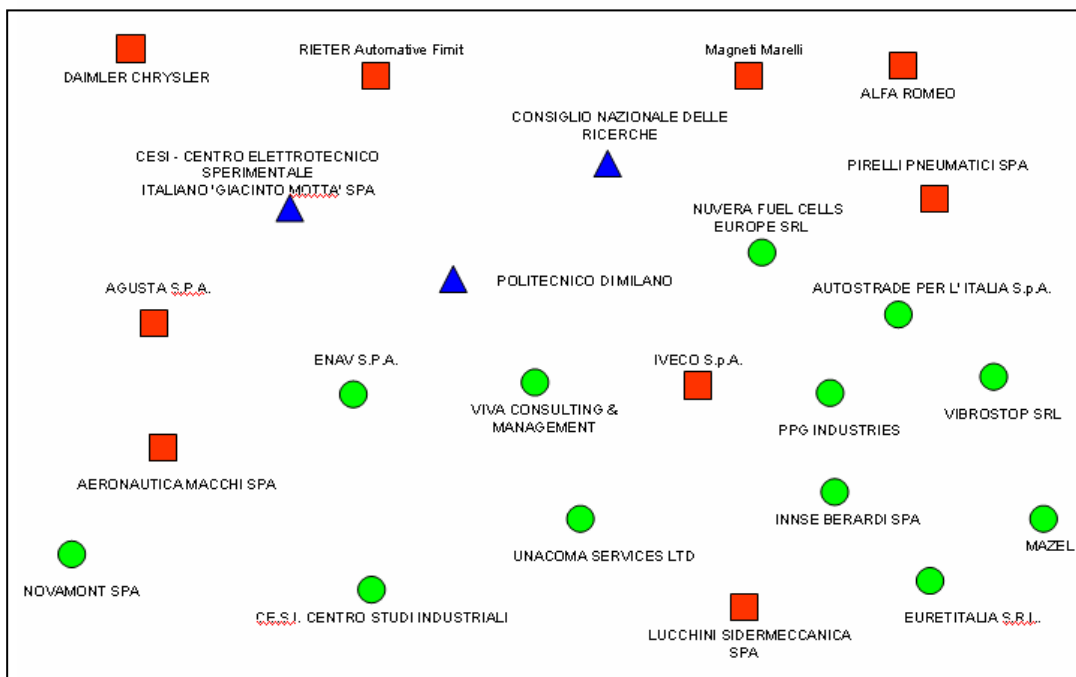
In addition, these two last are in a constructive competition: at each program or invitation to tenders, they systematically answer one against the other, accentuating the effect of domination of their know-how, and therefore their international presence. Some even claim that it would act as an organized competition, with the multiple parts.

To meet these skills in research and study, the established companies developed know-how linked to materials and associated services. Their markets seem limited to the local ones.

3.3.9. *Milan, Italy*

CLUSTER
Sectors : Automotive et Aeronautics
Key Competences : Research and Engineering
Visibility : Good
Attractiveness : Very good

Local Industries
Automotive
Aeronautics
Metallurgy
Products in metal
Mechanics
Products in rubber
Textile
Shoes
Wood-decoration
Toys



Comments :

This territory is really full of actors and typologies.

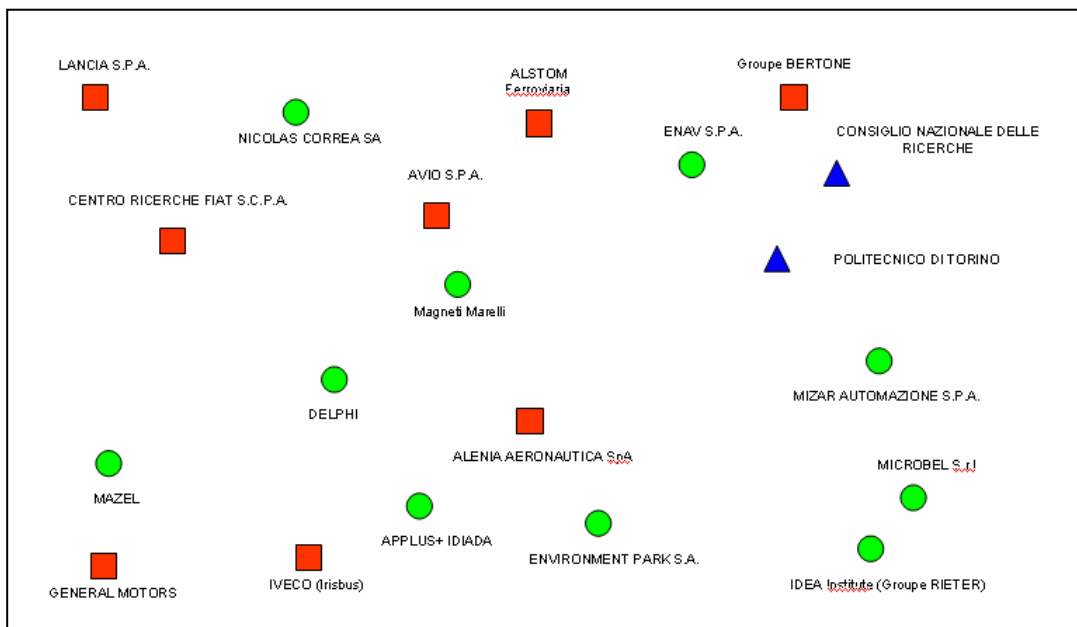
In this centre, the University plays a role as much of formation than of research. Besides, the different research centres are well connected and in good touch with the industrial network. Well-known automobile and aeronautics companies are present here, with actors particularly devoted to the NVH competences development too, like in the case of Rieter Automotive Fimit company for example.

The region is extremely well located, accessible for Europe and benefits from all the modern industrial services.

3.3.10. Turin, Italy

CLUSTER
Sectors : Automotive, Aeronautics and Railway
Key competences : Research and Engineering
Visibility : Good
Attractiveness : Very good

Local industries
Automotive
Aeronautics
Railway
Mechanics
Taps, fittings and valves
Textile
Works of the gold
Household articles

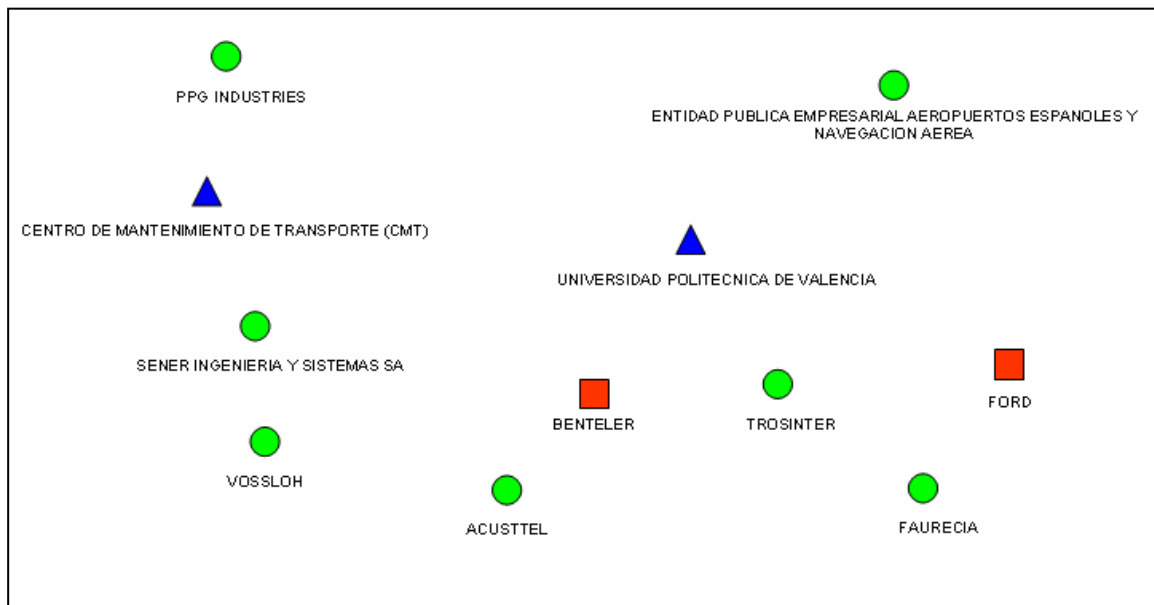


Comments :

In this territory, the number of actors and their typology are rather high. An education and research role is played by the University. The research centres present in the territory are very well connected and in close touch with the enterprises. For example, it has to be noticed the construction of a branch office of the Polytechnic of Turin near the factories of the Alenia Aeronautica SpA company. There are present well-known automobile, aeronautics and railway companies, with actors that are concentrated specifically to the NVH competences development, like in the case of IDEA Institute (Rieter group). The geographical location, the easy access and the importance of the infrastructure make this region very attractive.

3.3.11. *Valence, Spain*

CLUSTER	Local industries
Sectors : Automotive and Railway Key competences : Research and Materials Visibility : Average Attractiveness : Weak	Automotive Railway Construction



Comments :

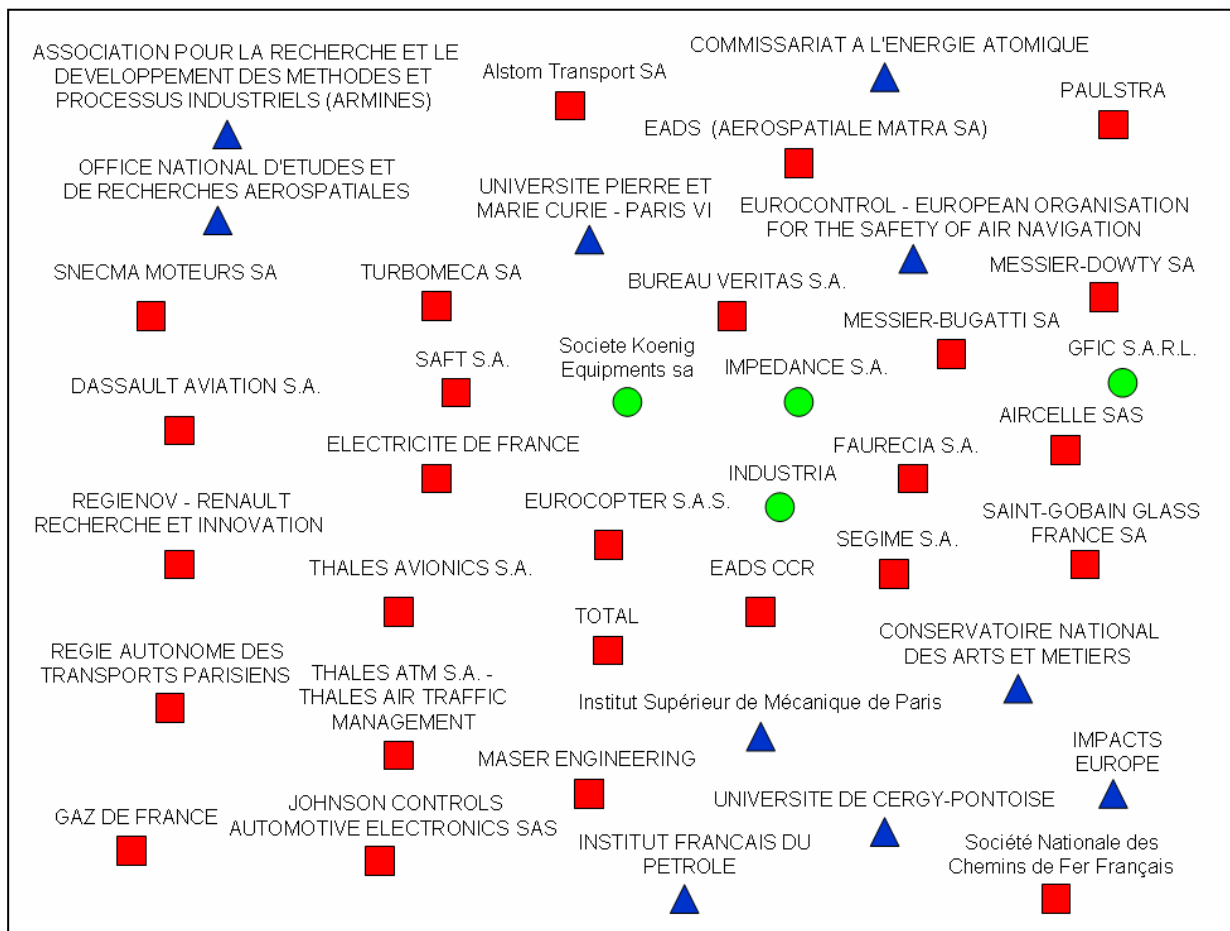
This territory benefits above all from the University Polytechnics of Valencia's presence, actor increasingly active in European relations. So, well-known automobile and railway companies are present here, but not relevant actors in the NVH competences development.

Finally, the weak industrialization, the little possible synergy with other industries present and the distance of the decisions centres make a weak attractiveness for this region.

3.3.12. Paris and Ile-de-France, France

CLUSTER
Sectors : Automotive et Aeronautics
Key Competences : Research and Engineering
Visibility : Good
Attractiveness : Very good

Local industries
Automotive
Aeronautics
Eco-activities
Image
Bio-sciences
Information Technology



Comments :

In this territory, the number of actors and their typology are extremely various. But it is missing of SME's with a high level of specialization, compared to Lyon for example. Well-known automobile and aeronautics companies are present here, like Renault and EADS for example.

Research and innovation hold a strategic place in the enterprises and the private research centres find in the region many partners among public laboratories and universities, strengthening this way their competences.

This region is the seat of many decisions centres, it's extremely well connected to Europe and the whole world and benefits from all the modern industrial services.

### 3.4. Segmentation and positioning of the centres

The objective of a strategic segmentation is to create a theoretical representation of various possible businesses in the simplified shape of a table. Two multiple criteria strategic axes are selected. They allow a better understanding of the business because of the creation of several strategic segments. To each segment corresponds the clear behaviors of businesses, that can be summarized by the 5 forces graph of Porter (if two segments strictly have the same distribution of the forces, for the same arguments, they define the same segment and you have to change your segmentation axes). In each segment a population we find obeying the same rules of business.

#### 3.4.1. *Axes of strategic segmentation*

Thanks to the economic approach of made intelligence, the information shared within the group and the resulting analysis enable us to define the strategic axes on which these centres seem to position:

- technological orientation: if technology is strictly the future of the economy and of our comfort, its evolution and thus its use are varied. It comes from the knowledge created by research; this knowledge is then materialized in first applications at the time of study, and to transfer if required to industry in the form of projects; it "is then standardized" in the form of technological standard products .

For the NVH, of very technical nature, we follow the same curve of life. Seek - Study - technological Platform.

We will adopt this first segmentation axes.

- applicative orientation. Often joining the concept of product-service, which is the two principal shapes of good valorization, we will add the concept of integration, i.e. the new requirement of the market which wants that the most advanced sectors do not buy any more services nor even a product but its implementation in its centre, in communion with the functional environment of use.

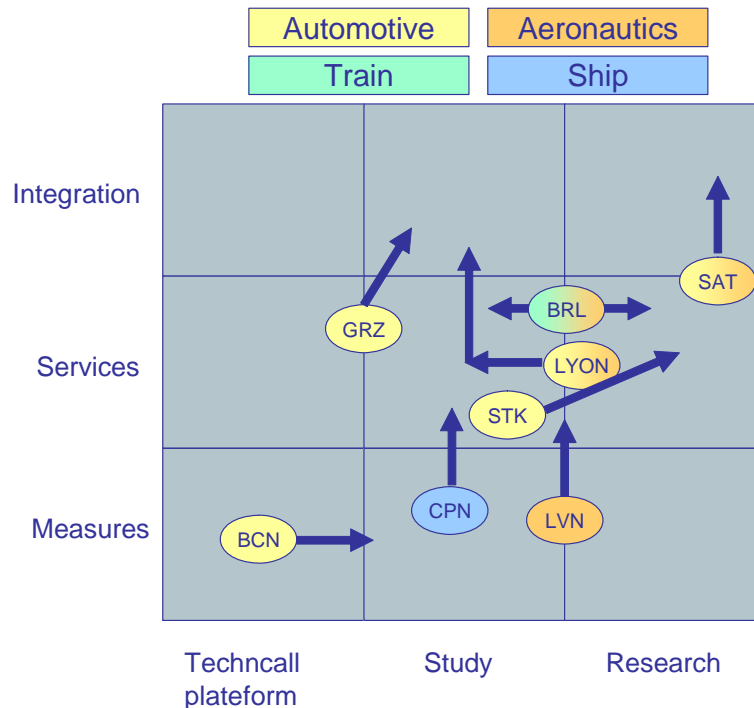
We will thus have three concepts thus: Measure - Service (service, specific matter manufacture) - integration.

This segmentation chosen, we place in the graph all the studied centres according to their characterizations.

The graph proposed below is valid only in a short time (approximately two years) since each pole evolves/moves.

It belongs to the present working group and the cluster to adjust this representation by the continuation of work of division and the research of information on the centres which it wishes to follow.

3.4.2. *Strategic positioning of each identified pole.*



3.4.3. *Comments on the segmentation:*

This graph makes possible to simply visualize the positioning of each pole compared to the sectors which they address like compared to the developed businesses.

Initially, we can observe that no great competition is marked between the centres. When two poles are close, they generally specialized on a special market, like railway or automobile markets for example.

On the second hand, each one has a clear positioning, defined by competences of these members and his equipment. It is naturally to put in adequacy with the industrial history of each one. We can notice that the territories with manufacturer headquarters profit of the most concentration of research skills, and that reciprocally, the territories of subcontracting have developed technological applications to satisfy either a local market of test, or on the contrary, a market without particular need for proximity (where a commercial presence is enough as for the test and measuring equipments).

Lastly, the arrows reveal us the trends of modification of positioning, revealing of the strategy applied of each one.

First remark is that all the centres move to the industrial fields of the study. This is explained by two elements. On the one hand, many territories have invested during the Nineties in the technological platform and in the implantation of huge industrial tools. Currently, the actors are trying to develop this equipment and some linked services, through the studies by i.e. In addition, the tendency of the clients is to regard the NVH as a source of marketing differentiation; they invest strongly internally in teams of studies and engineering in order to identify concepts and axes of improvement in a competitive spirit with the other brands. It results a need for validation and development for the found ideas, creating a need for studies accentuated in opposite of needs for tests or for research, often second targets.

The second observation notes a slow displacement of the centres towards more and more complex services whose ultimate objective is integration. They are naturally the territories profiting from study centres of the clients which have a lead over this evolution.

#### *3.4.4. Positioning and evolution of the European clusters.*

The current positioning of each pole depends naturally on its internal factors of differentiations which give him its upgrading capabilities:

- Barcelona: currently, this territory cannot really progress on the technological axes. It has essentially of a technological platform of tests, a single laboratory and a whole of manufacturing companies of automobile subcontracting, without decision-making power clean. With the benefits of the climatic conditions favorable to the tests carried out, this territory must bet on an increase in the services around this instrument, in a industrial or research way. The important thing is to control the standard development of platform in the same way and to impose them like the single serious territory to test and to impulse the standard in the long term. Secret to be successful: to associate the manufacturers this objective.
- Copenhagen: even if its essential force results from its know-how in instrumentation of measurement, this pole is directed towards the sophistication of these products and the installation of service towards its customers.
- Louvain, the most complete pole in term of typology of actors, seeks to sit his position by reinforcing the bonds with the OEM's and clients. Its only problems are not to have a keen local demand and to be an eternal foreign partner.
- Stockholm: this pole seems to bet much more on its capacity of research on its industrial potential. The perceived objective is to become the main actor in research with these two headlights: KTH and Chalmers. The rest of the cluster should benefit indirectly from this strategy by co-partnership or technology transfer in the collective research programs like the European ones.

- Graz: organized around the "Acoustic Centre Competence", the partners gather one of the most important technical poles and study on the NVH in Europe, available in service. Thanks to their integrative semi partnership on the level of the production and studies in the fields of subcontracting in German automobile sector, this group seek to also anchor this behavior to the level of the NVH in a more total way on Europe and the world. The omni presence of actors like AVL or Magna-Steyr on the international scene and in the German and European institutions ensures them of a fast and effective impact.

- Berlin: focused essentially on the railway sector, this territory has a solid base of competence of research and companies in engineering and design department. Its strategy is for the moment fuzzy: there are an effort of structuring of research and teaching around the TUB (University of Berlin), but we don't know exactly his relations with the big manufacturer. It does not seem that it develops strategies of integration, however this pole can develop two opposite -and at the same time- complementary behaviors: to continue to accentuate its scientific field and to become impossible to avoid on the railway one or to transfer to the economy this know-how within the companies and to develop a territory of strong services of studies. Suffering from low competition in railway NVH, its strategy could be less aggressive than those of the other poles.

- Southampton: centred on laboratory ISVR, the strategy is simple and radical: to marry research with the industry of the automobile assemblers (in other motor mechanics) by binding the researchers to the latter (their wages are dealt with by the industrialists) by preserving however the independent laboratory. There still exists a contract of services between industrialists and the ISVR. The objective is thus to reach a symbiotic level of integration.

- Lyon: strongly drawn by these multiple laboratories, Lyon is likely to profit from the strongly internationally recognized presence of two companies and a panel of others in voice of recognition. If the average size of the companies appears low, the proximity of these actors allows the easy creation of project groups which can answer the most complex requests, seen of the panel of services and products available. The laboratories develop a true will of fructification of the theoretical assets, which encourages the transfer and the swarming of knowledge and contribute to the further behaviors (At January 1, 2006 was born a new company from service, Matelys, on Materials NVH, resulting from the laboratories). Thus, Lyon is taking an important dimension of service with a will in the long term to propose complex studies in an integrated way.

## 4. GENERAL CONCLUSION

This study provide a concrete representation of the main European territories on the NVH and their probable evolutions in the short run.

Admittedly some were isolated study, like Aquitaine, Mans, Stuttgart, and well of others. Often these territories benefit from a tests centre of automobile very related to clients without offering an economic territory more varied: this is not the definition of a cluster or economic pole.

Under these appearances of simplicity, this study made it possible to gather great numbers of information no available in the literature and currently not controlled by the specialists: localization of the true concentrations of know-how, identification and characterization quasi exhaustive their members, qualification of behaviors and historical.

This analysis can thus be used as a basis as well for the economic organizers in order to establish or to look further into their strategy of development as to the boss of undertakings wishing better to understand the behaviors of their competitors through macro knowledge of their close environment. However, it remains with each one a work of deepening and appropriation of the study according even to its territory, described or not in this document.