

Project no.: 229514 KEEN-Regions

KEEN-Regions

Knowledge and Excellence in European Nanotechnology Regions

REGIONS OF KNOWLEDGE Maximising the benefits of research infrastructures for regional economic development

D4.2 – Joint Action Plan of research and technological development activities

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CO	Confidential, only for members of the consortium (including the Commission Services)	

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0 - Why a JAP?

Nanotechnology is a very promising area as the potential applications are broad and transversal and the impact for the local development is high. To gain a competitive position in this field and to foster industrial innovation, EU research infrastructures require more and more resources: multidisciplinary competencies, investments for up-to-date technical equipment, skilled HR, and strong links to the business community. This is why many European regions since years have given priority to the development of this strategic sector, launching policies and infrastructures to stimulate the growth of specific competences, to set up state-of-the art facilities, and to promote the education of skilled researchers. To this end, many well-established research centres in Europe are working in research-driven clusters, aggregates of key-players who are not just researchers, but networks of competitive companies and public authorities. This is the case of Veneto Nanotech (Veneto), Minattec (Rhone-Alps), and Gaia (Basque Country), which together combine vast resources in public investment, research laboratories and staff. The three areas share a strong commitment to the development of Nanotechnologies clusters by the regional administrations, with the aim of directly connecting Nanotechnologies with the local traditional manufacture sectors, widely present in these areas and representing the privileged demand side.

Since 2008, KEEN-Regions partners have been working together. The consortium consists of 11 partners, representing the triple helix actors in the three Regions.

KEEN-Regions project aims to accelerate and enhance the innovation process and the research development of the three nanotechnology clusters by means of

- Enhancing interregional mutual learning,
- Building up stable and synergic collaborations and exploiting the complementarities between the research driven clusters (RDCs),
- Improving links between regional authorities, research entities and the local business community,
- Maximising the use of research infrastructures,
- Fostering transnational cooperation in areas of common interest,
- Developing a Joint Action Plan for Nanotechnologies.

KEEN-Regions partners have adopted a multi-step approach with the aim to set up an agreed Joint Action Plan (JAP). This JAP translates local shortages and inter-regional synergy potentials in the nanotechnology sector, as they were identified by the partners, into **concrete proposals for actions**.

The JAP includes

- a set of actions at local level considered by each cluster as most beneficial for the economic development of their local area, and

- a set of actions at trans-regional level considered most promising for economic growth of the KEEN area and the definition of the process to reach the stated goals.

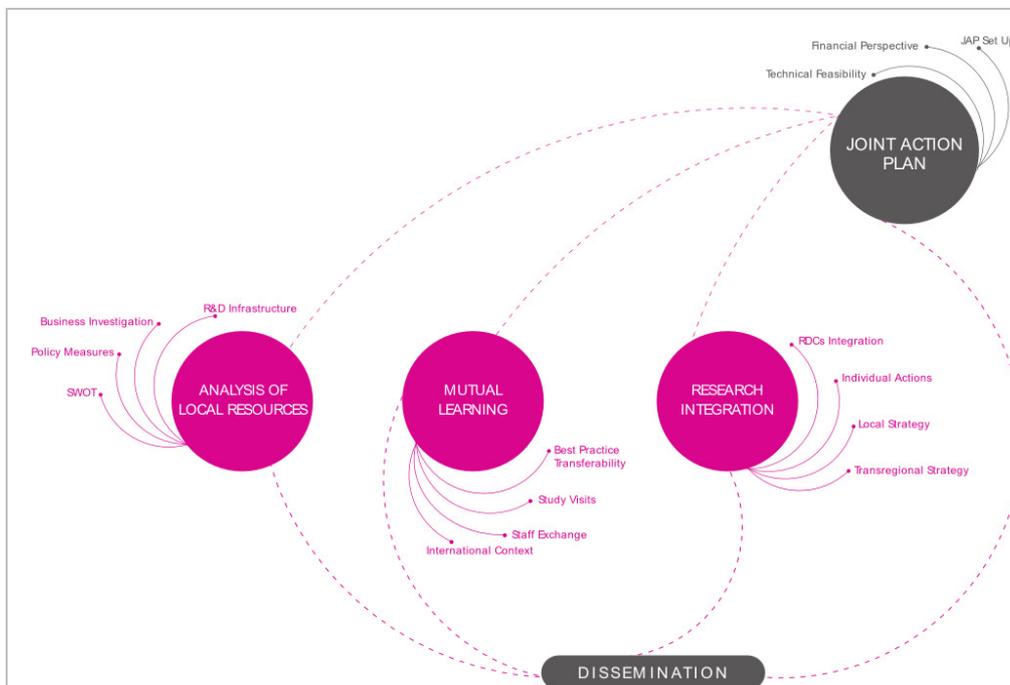
The JAP aims to create synergies and to share new methodologies among KEEN-Regions partners. It is the **final outcome of KEEN-Regions**, being based on all activities carried out throughout the project and on agreed measures that will be implemented by the partners of the consortium.

As a consequence, this JAP aims not to be a visionary document but to lay solid foundations for sustainable actions and partnerships contributing to the development of nanotechnology in the partner regions.

1 - How we got here. Methodology and main findings

KEEN-Regions consortium adopted a smart methodological framework based on three steps (mapping and analysis of existing resources, mutual learning and research driven integration), aimed at delivering a strategic analysis at policy level on perceived needs and feasible solutions in the three partner regions. A bottom-up approach marked the whole process leading to setting up a JAP.

Figure 1



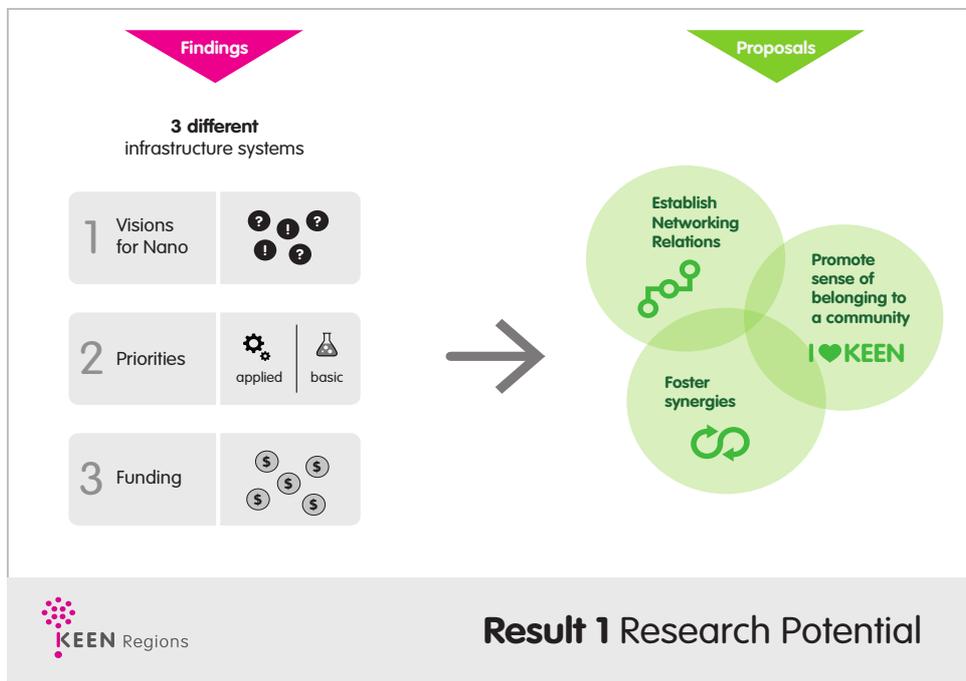
An initial **mapping and analysis of existing resources** phase served the purpose of sharing and collecting selected information about each RDC, in order for the partners to gain information about R&D infrastructures, business potentialities and policy measures/schemes for Nanotechnologies in the other regions. Partners also developed SWOT analysis on a regional basis, which helped identifying the main challenges and gaps in the cooperation patterns and developing ideas for new local and collaborative instruments, as well as for cooperation topics.

Thirty institutes and laboratories in the three Regions were assessed to get an overview of the research potential (Figure 2). The 3 RDCs present very different infrastructures systems for Nanotechnologies. In first place, they focus on different fields: the Veneto cluster developed high level of expertise especially in surface treatments (e.g.

protective and functional coatings) because they have a direct impact on leading sectors such as plastics, mechanics and the sport system sectors, the Grenoble area is recognized as a worldwide leader in microelectronics and software and therefore boosted the development of a research centre specialized in micro-Nanotechnologies (nanodevices and sensors) and the Basque Country has particularly exploited research in bulk-materials (e.g. nanocomposite polymer materials and powders), the convergence of micro-nano-bio, enabling tools and techniques, and safety. Besides, each of them privileges applied or basic research according to its own mission, and they dispose of very different ranges of public/private funding, something which impacts on the different sizes of the RDCs.

As a consequence of their significant differences, it emerged that a sectorial approach would have only partially benefited the involved RDCs. It was agreed instead to work on common problems and needs, adopting an horizontal approach. The main proposals concerned the setting up of tools to establish networking relations, foster synergies and promote the sense of belonging to the KEEN community, as necessary means to maximize the use of the research infrastructures, to encourage relations between researchers and to ensure the sustainability of the results of the project beyond its end.

Figure 2

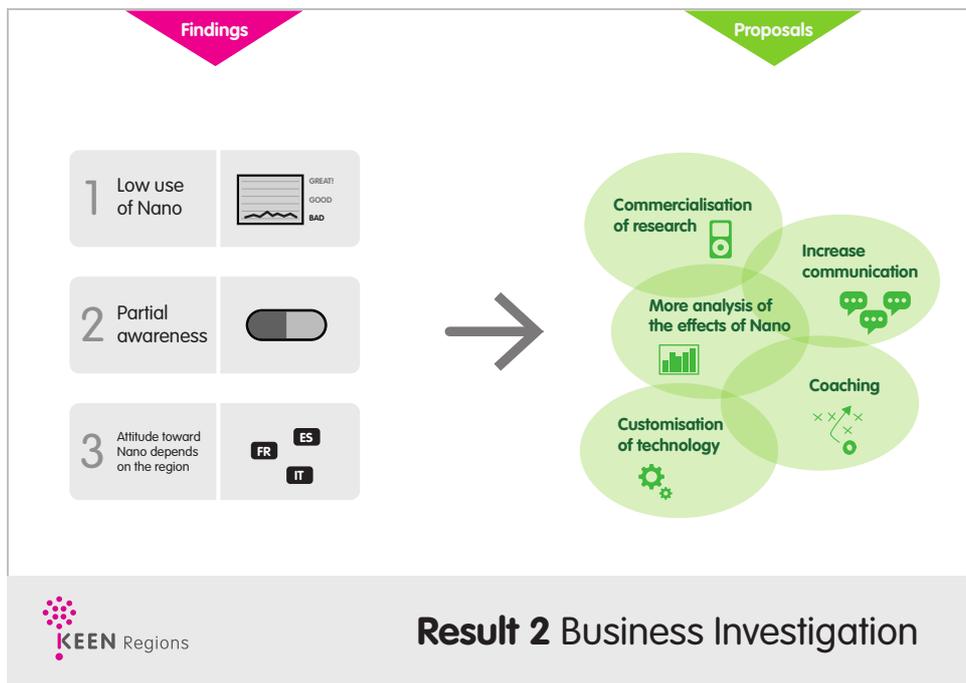


The business investigation analysis was carried out with different modalities in the three RDCs, with the aim to explore the needs and the potentiality of the business side and to understand the approach of companies toward Nanotechnologies (Figure 3). Overall results highlighted that, despite companies perceive the huge economic

potential of Nanotechnologies, they only have a partial awareness of what they are. Companies deem the undertaking of scientific/technologic collaborations with academia a key aspect for implementing Nanotechnologies in their programmes and products, but they also recognize that the company's size is a relevant factor to decide which micro/Nano activity to embark on. Therefore, it would be worth for them to define and implement specific measures taking into account the different level of request and of support needed, increasing in that way the resources and funding available both during the R&D and the industrial development phases. Time to market of Nano-applications is considered a major barrier for companies, so that the need to improve cooperation among researchers and business actors and the awareness on concrete potentialities of the nanotech sector emerge as key challenges.

Proposal for actions will then include tools for increasing positive awareness among companies on the effects and applications of Nano, and for promoting the commercialisation of research, by means of customizing technology according to the needs of the companies and offering targeted coaching services.

Figure 3



With a view to reach a general overview of the different policy actions and funding schemes for Nanotechnologies in the three RDCs, data were collected (Figure 4). Representatives of local authorities in the three areas were asked to provide quantitative and qualitative data concerning policies, tools and financial schemes supporting the cluster development, as well as the regional development plans and the research agendas.

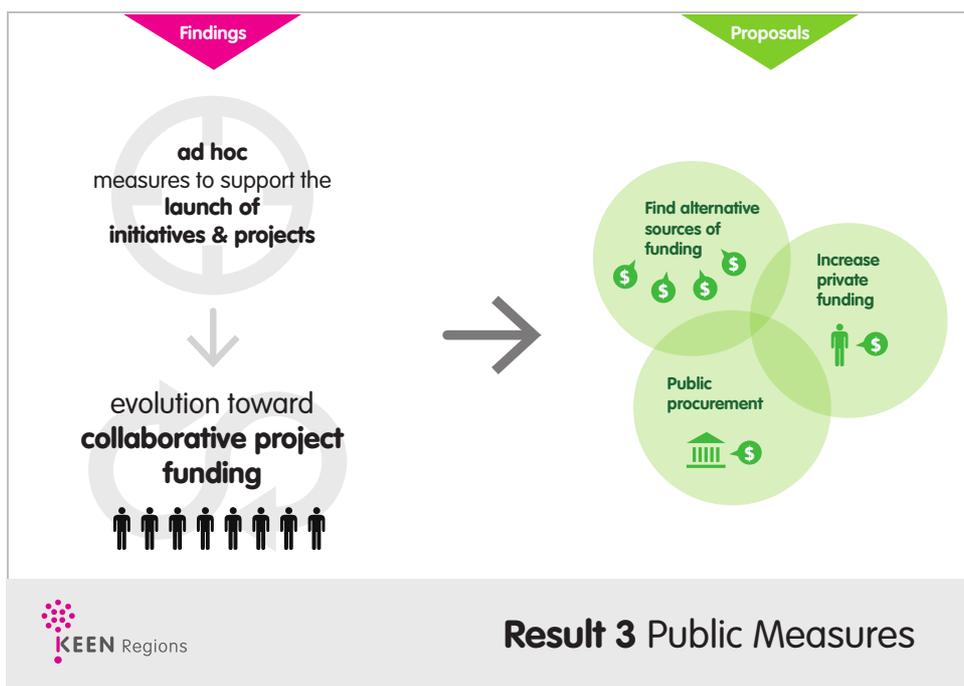
It was generally observed that public support has been the most important engine for the development of the

sector since the beginning. Nonetheless, the objectives of the funding have progressively shifted from the set-up of research infrastructures to the funding of collaborative projects research-research and research-business.

As a consequence of the decrease and cuts in budgets from the public administrations, it has been considered that research institutions and clusters will be required to find alternative sources of funding in the future, increasing considerably the collaboration with private institutions and companies.

In addition, a topic of discussion related to policy actions is public procurement. The purchase of goods and services and the ordering of works realized with Nanotechnologies by a public authority can significantly impact two aspects: the commercialisation of research results, by means of acquiring existing technologies, and the boost of new research lines. Therefore, the public authority acts as a client and contributes to creating a market for Nanotechnologies.

Figure 4



In parallel with the mapping and analysis of existing resources, a mutual learning phase was carried out. Three in site visits were conducted in partner laboratories, meeting key players and local stakeholders. These visits intensified the exchange of information between the partners since the beginning of the project, their mutual knowledge and the building of interpersonal relations.

As a follow up to a general exchange of information between the partners, 26 transferable best practices on nanotechnology initiatives, programmes and funding schemes were identified and shared. The exchange of the

best practices resulted very useful for selecting the common topics of interest for future cooperation. In particular, 3 macro-topics were identified:

- Foster and improve the cooperation among research and business;
- Stimulate the generation process of new ideas;
- Support the development of an instrument for the international mobility of researchers.

For these three topics, three already tested “practices” were taken as an example, to be further developed in the following phase:

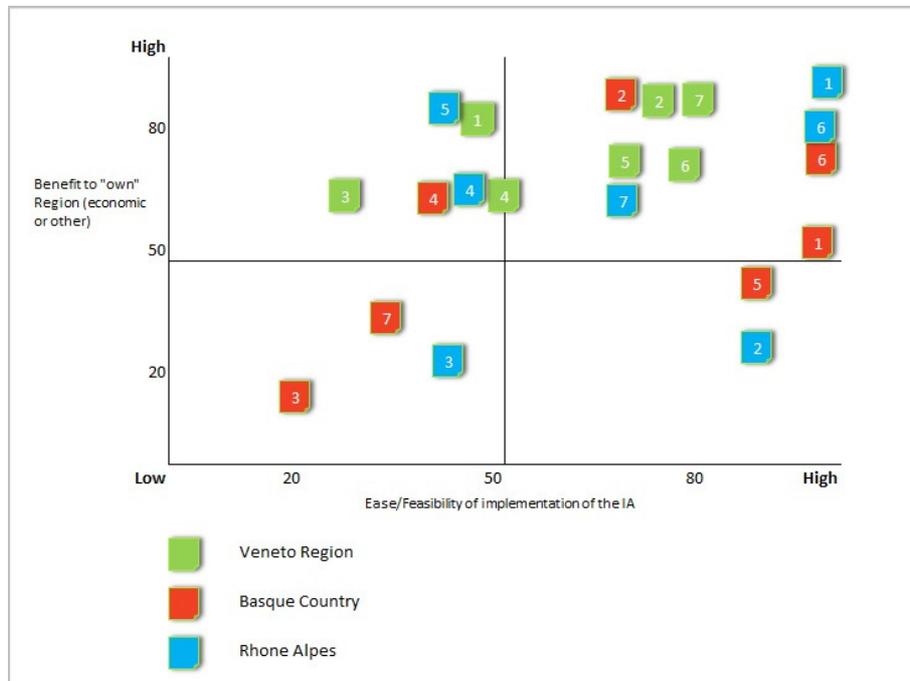
- The coaching approach toward SMEs of CRACA;
- The IDEA Laboratory methodology of CEA;
- The Ikerbasque mobility scheme of SPRI.

The **research driven integration** phase moved from the synthesis of the previous results, with the aim to propose agreed solutions to common problems among the three RDCs. A working group methodology was adopted, so that the in-depth analysis of the three macro-topics was carried out by three groups, which discussed and identified feasible initiatives at local and trans-regional level. Overall, 22 individual actions (15 at local level, 7 at trans-regional level) were proposed by the working groups. Each RDC organized a regional meeting afterwards to select those actions they considered most beneficial for their local area and for transregional cooperation.

The seven selected actions at transregional level were the object of a specific session (Foresight exercise), which focused on **setting up of the JAP**. Participants engaged in a thinking exercise to add new elements and to provide a significant direction for the JAP. The session involved the partners and external experts, led by a facilitator. The role of the experts was to provide an external point of view and a fresh input on possible ways and tools for joint collaboration, as well as to suggest successful cases in the EU. Partners were able to define the expected benefits for their region and the feasibility of implementation of the seven action. A matrix scheme (Figure 5) visualizes the results of this exercise.

Overall, the three RDCs gave a higher priority to promoting the relations between research and business, medium/high priority to establishing tools prompting the generation of new ideas, and a low priority to fostering the trans-regional mobility of researchers. The results have to be analysed taking into account shared weaknesses among the three RDCs in the first two topics, against the existence of well-developed mobility policies in two Regions out of three. As a consequence, partners agreed to develop more the trans-regional actions aimed at reinforcing areas perceived as most promising and beneficial for all.

Figure 5



1	Set up a KEEN partners program for access to research infrastructures by the companies
2	Work together to set up in each of the KEEN regions an Idea's day
3	KEEN partners jointly apply for Marie Curie Actions
4	Joint submission of European projects (focus ERANET scheme)
5	Act to have both public and private sectors involved in the platforms and infrastructures for collaborative work
6	Edit a booklet and organize dissemination sessions to provide a spectrum of business development activities and creative methodologies to support the generation of innovative projects with commercial potentialities
7	Promote the use of equipment and research infrastructures by the companies

A transversal issue which emerged throughout the project is the need to communicate Nanotechnologies more and better to society and to companies. As a consequence, the topic is present in the majority of activities included in the JAP.

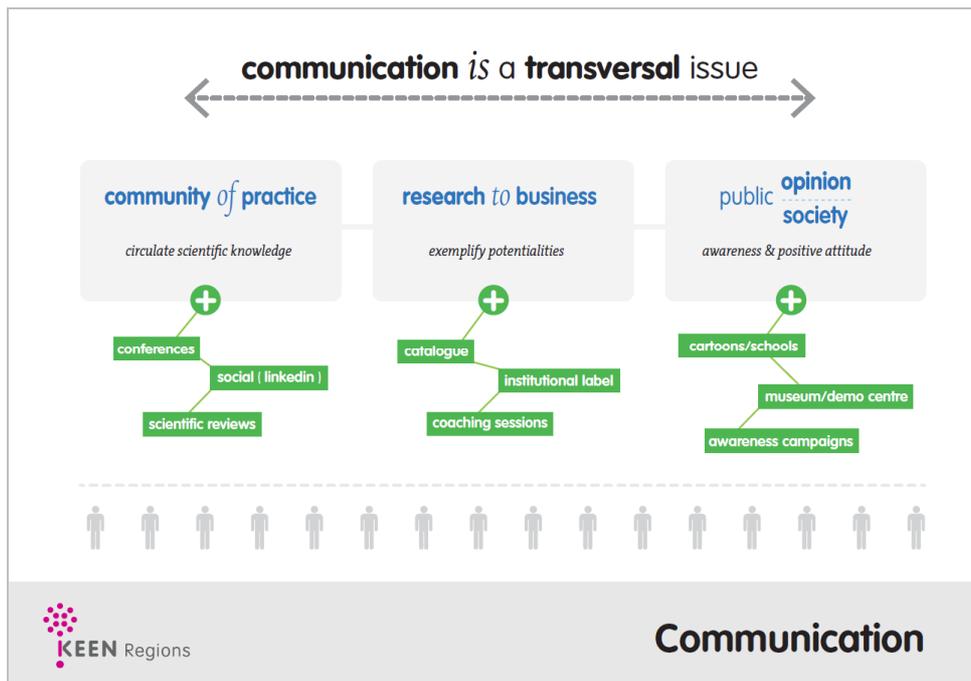
Whether the actions address companies, researchers or society, the target groups need to be offered the proper tools to learn and to participate in the communication flow (Figure 6). Researchers in RDCs will create a community of practice, circulating their knowledge by means of capitalizing the use of existing infrastructures or using new

social network tools. Companies will be involved in targeted dissemination activities, aimed at exemplifying potentialities of Nanotechnologies in their business and offering suggestions for new applications.

Finally, communicating Nanotechnologies to the general public is the most challenging activity, as public opinion is made of different groups with a wide range of attitudes and awareness towards Nano. Besides what one or few concrete actions can do, communicating new technologies to the general public needs to be the object of a careful examination from the policy makers, with a view to include it in a strategic agenda which links public engagement and democratic legitimacy of decisions about technology.

Despite partners acknowledged the equal relevance of the three communication strands, a special focus in the JAP has been given to upgrading communication tools towards the companies, in line with the priorities set during the Foresight exercise.

Figure 6



2 - The KEEN-Regions JAP

The JAP has been developed in close collaboration with the partners in the participating regions. Based on the regional strategies at local and at trans-regional level, the JAP includes the priority actions set for each RDC, and highlights the potential synergies which have been identified throughout the project activities.

Besides, several impending issues have been contributing to shape the JAP:

- Both the incumbence of the economic crisis and the reallocation of structural funds in the next programming period require dealing with increasingly limited resources and cut budgets,
- As partners regions present different specialisations in Nanotechnologies, a multidisciplinary and horizontal approach has been privileged. Nowadays, bounding the research spectrum is no more a sustainable option as wider competences are needed in order to innovate traditional manufacture sectors, to launch new ones (e.g. environment, energy, health) and more generally to boost the regional economic development;
- Communicating Nanotechnologies towards companies and society is an unquestioned priority, transversal to the majority of the actions identified.

The structure of the JAP consists of two parts:

- Priority actions at local level. A brief overview of each RDC, its challenges and main objects sets the framework for the actions selected at regional level;
- Priority actions at trans-regional level. Seven actions have been selected and categorized according to the three KEEN-Regions macro-topics.

For each action, a brief description of the activities, the involved stakeholders, the expected outcomes and the main steps for implementation has been made.

The implementation steps of the Joint Action Plan are complemented by the JAP Business Plan.

3 - From needs to priority actions at local level

3.1 Veneto

Veneto Region knowledge system features a high expertise of research entities in many different R&D axes and numerous skilled personnel with high-standard professional training. On the other hand, the local economy is made of traditional micro and small medium enterprises that belong to medium and low tech sectors, which carry out **innovation activities often triggered by spontaneous initiatives**. The big issue at stake for policy makers is to help the two sides increase reciprocal knowledge and consistent occasions for collaboration.

Both the Regional Law 9/2007, supporting research, innovation and technology transfer and the Regional Operative Programme 2007-2013, which foresees a reserve for nanotechnology projects within the Research and Innovation Axis, implement a regional strategy aiming to link traditional manufacturing sectors to new technologies. Up to now, considerable investments have been made to set up facilities and infrastructures, to form the human capital and to support collaboration between the research and the business community.

A large potential market for nanotechnology applications can be exploited, as several research groups are specialized in nanotechnology-related research lines and a technology cluster exists since 2003, as well as the local economy features a high degree of creativity and adaptability to the needs of the market. Moreover, even though large companies are more receptive regarding new technologies, their very limited presence entails the attention is given to SMEs. Such companies are expected to benefit strongly from Nanotechnologies, especially in fields such as nanostructured materials, surface treatments, coating and mechanical components ultra-functional.

Despite there is ground for increasing substantially the competitiveness of Nano in Veneto, the potential is poorly exploited. KEEN-Regions project highlighted that **low research-business cooperation** is due to

- a very **limited number of companies in the nanotech sector**,
- a **low awareness about potential applications** by the vast majority of SMEs,
- a **low attitude to IPRs** from the companies,
- a **scarce presence of researchers in companies**.

Companies suggest a good way to find out whether Nanotechnologies could be useful for them is to organise direct meetings with researchers in the labs or to have researchers visiting the company. Depending on the dimension, the economic sector, the availability of resources, the research capabilities and the potential for product distribution, companies must be approached accordingly, with the support of a mediator.

The actions identified at local level aim to support the development of Nanotechnologies, to facilitate the technological transfer and to create trustworthiness in society. All in all, **the utilization of Nanotechnologies by the industry is a core objective in the Veneto Region**. This is especially relevant taking into account the current situation of economic downturn, which requires dealing with limited resources. As a consequence, while **the stimulus from the public sector must become smarter**, companies must be the main supporters of Nanotechnologies and a user-driven approach has to be strongly encouraged.

Three challenges need to be addressed:

- As a consequence of the low awareness of Nanotechnologies and their applications, there is an unsatisfactory utilization of this technology from the industry and the research-business relationships need to be encouraged;
- As it takes long time to turn the results of R&D into products, the interest of investors has to be stimulated by presenting a clear picture of advantages and opportunities;
- The fragmentation of the local productive system, characterized by many small and micro and several medium enterprises, requires a customized approach according to the dimension of the companies.

In order to solve the above-mentioned challenges, the local actions identified by the KEEN Veneto partners aim to:

- Increase companies' awareness on Nanotechnologies;
- Detect the technological needs of the companies;
- Support companies in finding technological solutions to their needs;
- Foster the use of equipment and research infrastructures;
- Encourage a user-driven innovation approach among companies and in society;
- Facilitate the acquisition of innovative knowledge in the companies by means of getting them closer to the research actors.

Action 1: Nano-coaching for entrepreneurs

Description of activities and key stakeholders

The aim is to proceduralise a model for offering coaching sessions on Nano-opportunities to companies with similar needs and operating in similar areas.

This will be carried out by developing a "workshop + guided visit in lab" format. Researchers will give an overview of what Nanotechnologies are and what they can do in the specific sector of the selected companies. Successful cases will be presented during the workshop, with the entrepreneurs telling their experience. Afterwards, the companies will be involved in a tour to laboratories, where concrete Nano applications will be presented.

The beneficiaries will be mainly micro and SMEs, gathered according to the economic sector they refer to. As a consequence, the initiative will be promoted jointly by business associations and nanotechnology research actors.

Expected Impact

- ☑ Strengthened collaboration between Veneto Nanotech, business associations and companies;
- ☑ Dissemination of nanotechnology applications among companies;
- ☑ Increased collaboration between companies and nanotechnology providers.

Steps to implementation

- Veneto Nanotech takes the lead of the initiative and disseminate its aims among all potential stakeholders (business associations and research centres);
- Stakeholders interested in the initiative express their will to participate;
- A working group is set up with the aim to define a common format and common procedures;
- Each business association is in charge of collecting the expressions of interest from its associated companies and to schedule the activities jointly with the relevant research actors.

Action 2: Nano-package for companies

Description of activities and key stakeholders

The action provides companies with a package of services to help them envisioning a concrete way to boost their business. In concrete terms, companies will be suggested to adapt an existing nanotechnology application or to undertake a new research development. A broker will assess the company's needs, providing the contacts with external experts, and will evaluate the risks and the commercial advantages of the proposed solutions. This role will be undertaken by business associations, which with the help of a team of experts will support the SMEs or a network of SMEs in the definition of the implementing steps, as well as the planned costs.

SMEs with a low capacity to invest considerable amount of money and time for developing a new technology will be the privileged target of this action. Promising sectors in relation with Nanotechnologies will access the service: mechanics and mechatronics, plastic chemistry, wood products, constructions (focus on buildings renovation).

Expected Impact

- Increased innovation activities related to Nanotechnologies;
- Business-research cooperation enhanced;
- More businesses compete in global markets.

Steps to implementation

- Interested business associations agree on a common model to structure a service package for companies;
- Each business associations defines how to fund the initiative with regards to its relevant beneficiaries;
- A list of potential service providers is created following a call for applications;
- Communication materials related to the Nano-package are created and disseminated. Successful cases are used to promote the service;
- Each business association informs its associate members on the opportunities, and it is responsible for adjusting the offer in relation to the standard profile of its members.

Action 3: Rent equipment and a research team for your business!

Description of activities and key stakeholders

The action will encourage companies to exploit existing research infrastructures and have their staff teaming up with researchers. The complete list of the tools and techniques, together with possible applications of new materials, shall be made available. The companies will have the opportunity to ask for consulting and to visit the laboratories. The dissemination activity of the relevant actors will be companies-oriented and will include all necessary information, such as a specific list of infrastructures and available equipment, and a list of applications organized by sector and industry. The information activity will favour the rental of equipment and research staff by the companies.

All companies located in the Veneto Region and in the national territory will benefit from this action. Veneto Nanotech, which hosts the Nanofabrication facility, will take all necessary actions to implement it and to ensure the needed visibility.

Expected Impact

- Enhanced visibility of the Nanotech research infrastructures;
- Increased awareness on nanotechnology applications at local level;
- More collaboration agreements between companies and research infrastructures.

Steps to implementation

- A recognition of existing equipment and a comprehensive list of nanotechnology applications is made;
- The communication of relevant research institutes is adjusted accordingly;
- The conditions for the rental and the use of research infrastructures and equipment by the companies are defined;
- A database of interested companies is created and constantly updated
- Companies are informed about the service's opportunities.

Action 4: e-NanoMarketplace

Description of activities and key stakeholders

To further improve the collaboration between companies and research centres, an interactive tool will be made available. A web platform will be structured in two areas: an information portal will give an overview of available tools and techniques (with the possibility to have also detailed scientific information) and to the possible applications and properties of nanostructured materials; a second area designed to foster the match between companies and research centers.

To this aim, the existing KEEN-Regions website might be used and adapted. As the platform is expected to benefit both companies and research centres, it shall be managed and moderated by the regional agency for innovation.

Expected Impact

- A dynamic space for matching demand and offer at national level is created;
- Increased number of companies embracing Nanotechnologies;
- Maximized use of Nanotechnologies at local level.

Steps to implementation

- The regional agency for innovation and the regional authority agree on the terms for the implementation of the platform;
- The concept of the platform and the process model are carefully defined involving all relevant stakeholders at regional level;
- An expression of interest from relevant research centres is collected;
- A strong dissemination campaign is launched.

Action 5: Nanotech Demo centre in Veneto

Description of activities and key stakeholders

The Demo centre on nanotechnology applications will showcase possible solutions in one facility, providing visitors with hands-on examples of what Nanotechnologies can do in different fields of application. The utilization of virtual models and of 3D virtual design will offer concrete opportunities for SMEs to access technological simulations. The centre shall put at disposal of the companies virtual reality simulation tools to support the experiencing of Nano applications.

The main target visitors are companies, especially SMEs, which can be sensitized by taking part to testing activities. Entrepreneurs will see and touch the advantages and potentialities of using Nanotechnologies to upgrade their products or to materialize new product ideas.

The Demo centre will be hosted and managed by research institutions, holding the necessary competences and equipment. The involvement of companies associations is fundamental to ensure the visibility and the success of the initiative.

Expected Impact

- Increased awareness of Nanotechnologies by the companies;
- Take on of a user-driven approach to Nanotechnologies;
- Increased commercialization of Nano-related products.

Steps to implementation

- The relevant regional stakeholders and companies associations agree on the set-up process of the Demo centre and define a clear business plan with a long-term funding logic;

- Software technologies are acquired and spaces/equipment/dedicated personnel identified;
- Promotional activities are planned and implemented.

Action 6: Programme "Business gains brains"

Description of activities and key stakeholders

The programme will aim to develop the SMEs competitiveness, by facilitating the acquisition of innovative knowledge from qualified external research facilities and services such as Universities, public research bodies, public and private laboratories and networks of Science Parks and Technology Clusters. Industrial research and experimental development contracts will be funded. SMEs will have the possibility to collaborate with external bodies, because of their inability to conduct the research internally, or to benefit from the "temporary use" of researchers/expert staff.

The implementing body of the action will be the regional authority, whereas the stakeholders involved will be the Universities, together with the local knowledge providers.

Expected Impact

- Enhanced Academia to business mobility;
- Increased research on Nano-related products;
- Valorized human capital in business.

Steps to implementation

- A mapping of technological providers in the Region is undertaken;
- Relevant regional stakeholders are involved in the definition of the action;
- Administrative procedures are accomplished by the Regional Authority;
- The programme is launched.

3.2 Basque Country

The commitment of the Basque Government's Department of Industry, Innovation, Trade and Tourism to nanoscience, micro and nanotechnology as a means of diversifying the industrial framework became clear several years ago and was confirmed in December 2008 with the official launch of the **nanoBasque Strategy** and the creation of an agency, namely the **nanoBasque Agency** at Spri, dedicated specifically to the roll-out of this strategy.

The incorporation of nanoscience, micro and nanotechnology as a strategic area for industrial diversification in terms of the Basque Country's science, technology and innovation policies was undertaken with two main goals: to exploit the huge potential applications of these technologies in almost every industrial sector in the Basque

Country, especially the car industry, aeronautics, energy, electronics, telecommunications, machinery/tools, steel, metallurgy and household appliances, and to promote the creation of new technology companies with the express purpose of taking full advantage of applications based on such technologies.

The first roll-out phase of this strategy involved laying its foundations with a significant public investment in knowledge generation, basically by creation of the cooperative research centres CIC microGUNE and CIC nanoGUNE, and its integration into the Basque Innovation System along with other scientific and technological agents with micro and nano skills, such as universities (UPV/EHU, Mondragón University and Tecnun) and technology corporations (Tecnalia and IK4).

The Basque Country can rely on a notable knowledge generation proposal in this field, especially its various cooperative research centres, universities and two major technology corporations. In this respect, the Basque Government created Ikerbasque, the Basque Foundation for Science, to develop scientific research in the Basque Country by attracting senior researchers and creating new research capacities, what has been identified as a best practice to be transferred in the framework of this project.

The increasingly important participation of companies together with science/technology agents in R+D projects in these fields, and the launch of a support system for the development of new business projects, with the creation of a nanoincubator, are a clear response to the business development and revitalisation actions proposed in this strategy. As a consequence, nanotechnologies in the Basque Country have significantly advanced in strategic areas such as **nano-biotechnologies, composites, magnetic materials and devices, optics, and sensing.**

There are currently 68 companies working in the field of micro- and/or nanotechnology in the Basque Country, although the number of companies participating in R&D projects in these areas is well over a hundred. Sixteen of the former are already marketing micro- and/or nanotechnology-based products or processes, and this number is expected to double in the next two years.

The cross-over nature of these technologies is reflected in the identification of companies from more than 12 different industrial sectors, the majority of which have high growth perspectives. Thus, the activity of an intermediate sector such as steel, metallurgy and metallic products, or final sectors such as the car industry, health and pharmaceuticals, should be highlighted.

One important finding is that only 10% of these companies are self-sufficient when it comes to developing their micro and nano activity, thus meaning that close collaboration with science/technology supply agents is essential. For this reason, most of the local actions identified at local level in the framework of this Keen project intend to contribute to promote the collaboration between companies and research institutions.

To this end, the nanoBasque Agency is working to establish a knowledge flow between research groups and between these groups and businesses required to generate value and foster innovative processes.

Several objectives keep being addressed in the Basque Country:

- foster the interaction of the research and the business actors;
- increase innovation and excellence in Basque companies;
- attract and foster the use of nanotechnologies by driving companies of different productive sectors of the Basque Country in their processes or products acting as drivers and prompting the industrialisation of nanotechnologies in the whole value chain of suppliers;
- push innovation activities related to marketable products;
- exploit research results by means of creating spin offs or start-ups.

The local actions identified by the KEEN partners in the Basque Country are intended to increase collaboration between SMEs and research institutions. Other areas identified such as the generation of new ideas or the mobility of researchers are already developed in the region by other initiatives. Therefore the local actions identified intend to contribute to:

- Increase companies' and society awareness on nanotechnologies;
- Promoting the awareness of companies on the opportunities available at regional level in this field;
- Addressing the joint participation of companies and research centres in R&D&I projects;
- Foster the use of equipment and research infrastructures

Action 1: Disseminating nanotechnology

Description of activities and key stakeholders

Each of the research institution partners in KEEN-Regions has already organized some dissemination sessions. In particular, nanoGUNE has organized some events or workshops to disseminate information about the state or the art in nanoscience research and to collect current interests and needs from the business side.

In order to promote innovation in Basque companies other dissemination activities are organized in the region, such as the Business Global Conference, the reference conference on innovation, technology and knowledge of the Basque Country, where managers of companies with success stories of all markets, small, medium and large companies, from all areas of the organization participate with international experts in innovation and exchange mechanisms and dynamics of collaboration through the sharing of ideas, leading to innovation. Furthermore, there are other dissemination sessions organized individually by each of the technology centers, or institutions that promote innovation.

Despite being carried out these kind of dissemination activities individually designed by each research institution, this action intends to offer dissemination sessions specifically designed for each type of company, also including in these sessions companies that are developing activities based on nanotechnologies in order to present concrete examples of applications, showing the main benefits and also the barriers and the problems they are facing.

Expected Impact

- Raised awareness on nanotechnology applications among companies;
- Increased collaboration between companies and nanotechnology providers.

Steps to implementation

- The relevant stakeholders agree on a common model and common procedures;
- Cluster associations and research institutions identify local companies or industrial sectors that could be costumers to locally developed nanotechnology;
- An exercise to identify the needs of target companies is planned. Clusters associations and research institutions match their respective knowledge on companies' needs and the capacities and technology offer;
- Design of the program of the session trying to find companies to serve as examples to others.

Action 2: Knowledge Map of Nano-technology offer

Description of activities and key stakeholders

Despite the fact that each of the research institutions websites provides information on the expertise, research areas, research team, equipment, types of developed projects and collaborations, no public regional mapping of the research capacities and expertise that work in the Nano field exists.

The Knowledge Map will offer homogeneous information of all Basque research institutions in just one document. It will facilitate the identification of the research institution for specific requests and it will also serve to raise awareness, both in our own region and beyond, of the available capabilities in nanoscience, micro and nanotechnologies in the Basque Country.

The Knowledge Map will be realized by nanoBasque Agency – SPRI, in collaboration with the Basque research institutions, in order to involve them in the process and collect up-to-date information about their activity. Contents provided by the research institutions will mainly relate to industrial applications.

The Knowledge map will include the following information:

- General data of the Research Institution such as name, type of organization, contact data, etc.
- Main results such us patents, articles, thesis and spin-offs;
- Description of the research lines related to micro and nanotechnologies specifically describing the potential applications of these research lines in the different industrial sectors;
- Description of research projects;
- Collaborations with companies.

Expected Impact

- Facilitated identification of the research institutions for specific requests;

- Increased research-industry collaboration.

Steps to implementation

- The concept development phase is carried out by nanoBasque Agency – SPRI;
- All research institutions dealing with nanoscience, micro and nanotechnologies in the Basque Country are requested to fill in a questionnaire with all relevant information;
- nanoBasque Agency – SPRI collects and organizes gathered information and implements the tool;
- A robust dissemination plan is drafted and implemented.

Action 3: Equipment for nanotechnology reference book

Description of activities and key stakeholders

One of the main barrier identified by Basque Companies to start their activity in the nano field is the access to equipments and infrastructures.

The purpose of the action is to offer to companies a complete list of services offered by the Basque research centres, which includes the following information: equipment, services offered using these equipments, areas of application, instrumental techniques used, location and contact.

nanoBasque Agency-SPRI has made a first exercise to know or identify the most important infrastructures in each of the research institutions working in the micro-and nanoscale and their level of use. The development of a complete list of the equipment and infrastructures to be used by the companies will require to complete the analysis with all the research institutions, make an effort to standardize a level of uniqueness that allows a map of the most important infrastructures in the Basque Country and especially to identify the services offered by these infrastructures gathering equipment, where appropriate, for services they can offer to interested companies.

nanoBasque Agency – SPRI will involve some companies in the process of elaboration of the list, as only testing with them the way services and equipment are organized and the information contained, in order to make it useful for companies.

Expected Impact

- Maximized use of the available equipment in research institutions by other agents;
- Transition of local R&D infrastructures towards "Foundry model" which further allows new business models for nanotechnology (fabless nano company);
- Fostered use of the equipment and research infrastructures by companies;
- Fostered collaboration between companies and research institutions.

Steps to implementation

- nanoBasque Agency – SPRI drafts a work plan, defining the information to be collected and how to organize it;
- Personnel with specific knowledge about business demands and needs and also knowledge about techniques and equipment and several companies are involved in the implementation process;
- A robust dissemination plan is drafted and implemented.

Action 4: Directory of Basque companies with micro-nanotechnology activities

Description of activities and key stakeholders

In 2009 the nanoBasque Agency- SPRI carried out a study based on a questionnaire, that identified a total of 68 companies with activities related to micro-nanotechnologies. The nanoBasque agency is willing to incorporate a private data collection and monitoring system in its website, in which companies can register and update their activity. The information obtained through the system is useful for several purposes. Firstly, it will feed a search engine that provides third party identification and contact with companies. Secondly, aggregate information for all companies will give a useful contribution for the annual report "Use of micro and nanotechnologies in the Basque business fabric."

This system of monitoring and data collection is key to the directory because it will be the main source of information on the Basque companies working with micro/nanotechnologies and it will allow nanoBasque to update the directory once a year when the companies introduce the information in the system.

The directory will contain the following information:

- Sector of activity and the main activity area of the company;
- Short description of company profile;
- Application area of nanotechnology including what they offer, to whom, the reason why their offer is better than others, how could be implemented in customer ´s products...
- Key words that define or identify their activities related to nanotechnologies;
- Contact details and other relevant information such as year of establishment, number of employees and turnover range.

Expected Impact

- Facilitated identification of companies active in these fields;
- Marketing of the companies supported as it allows searching by anyone interested;
- Arisen interest in micro/nanotechnology of other companies;
- Raised awareness on nanotechnology applications among other companies;
- Nanotech companies pushed into more customer-oriented communication.

Steps to implementation

- The concept idea has been already developed by nanoBasque Agency – SPRI;
- The web tool is mostly implemented;
- A communication campaign to make companies aware of the benefits of being part of the directory will be planned and launched;
- Companies have to update their data using the data collection system;
- Use these updated data to complete the directory information.

Action 5: Nanotech showroom

Description of activities and key stakeholders

In June 2010 BTEK, the Basque Technology Interpretation Centre of the Bizkaia Technology Park was opened with the aim of taking technology closer to young people, mainly at secondary school level, promoting a scientific and technological culture among young people. The centre has different spaces such as the “Innovation Kiosk” that offers information on the latest scientific and technological advances in our environment or the “Full steam ahead! other worlds around us” where Nanotechnology, Biotechnology, Robotics and Sustainability are the main modules. The idea of the proposed activity is to give more visibility, using the existence of this center, to all the developments made in the Basque Country in the field of nanotechnology, not only by the scientific-technological agents but also by companies and guide this activity not only to students, but also to other companies and entrepreneurs.

The main target visitors in this case will be companies and entrepreneurs in order to show them the advantages and potentialities of using nanotechnologies.

The involvement of all the research institutions and active companies is fundamental to ensure the visibility and success of the showroom.

Expected Impact

- Increased awareness of nanotechnologies by the companies and by the society in general;
- Increased scientific and technological culture among young people.

Steps to implementation

- Agree with the Center on the terms of the implementation of the activity;
- Involvement of all stakeholders in providing content to the showroom and updating them;
- Promotional activities are planned and implemented.

3.3 Rhone Alpes

Rhône-Alpes boasts France's second-largest regional economy and second region for R&D investments both at public and private level, with Grenoble's ecosystem being particularly favourable to micro- and Nano-technologies and embedded software industries. Rhône-Alpes is home to highly-innovative start-ups, leading research laboratories, unique scientific facilities such as Minatec. It stands out for the concentration of competitiveness poles, as Minalogic, Lyon Biopôle etc., actively promoting the connection of research, companies, schools, society with the aim to link research results towards societal and market needs.

The micro-Nano scientific community relies on 3,000 researchers, as in the same sector 21,700 personnel is employed in businesses. Thus, a very large spectrum of scientific knowledge is provided, featured by an industry-oriented R&D approach. Massive investments on nanotechnologies have been done in the Grenoble area since last decade from the national government and from the local governments. Several research programmes are supported by the public sector, and the public research organizations benefit from the existence of technical collaborative platforms and several networks which allow a proper coordination of actions among the different actors/stakeholders.

As far as the economic context is concerned, Rhône-Alpes region hosts the most important industrial cluster in France in the field of microelectronics, nanotechnology and embedded systems on chip. Most of industries in the micro-Nano sector are leading corporations or big industries which research, manufacture and launch products in the market. Most of the economic sectors are interested by the application of Nanotechnology results (chemistry, ICT, materials, medicine, environment...), so that the existence of a dynamic critical mass at local level represents a strength and an opportunity at one time. **Only a small number of SMEs operates in the nanotechnology sector**, so that **a huge potential for market exploitation remains unused**. Several initiatives have already been undertaken to face the issue but new ways need to be explored. Moreover, **private funding presence is still weak** compared to public funding means.

Notwithstanding the successfulness of national and local strategies for nanotechnology, KEEN partners in the Rhône-Alpes region highlighted a specific challenge to be addressed in the future concerning the mobilisation of SMEs in the nanotech sector. In particular, it was agreed on the need

- to transfer big technological advances achieved in laboratories to small to medium companies likely to bolster their competitive advantages;
- to harness the power of innovation to speed up new product development and reduce time-to-market.

As a consequence, the local actions identified by the KEEN partners in the Rhône-Alpes region intend to

- canvass SMEs towards the use of nanotechnologies for solving their innovation needs;
- support structural projects that aim to promote Nano electronics for SMEs.

Action 1: Rhône-Alpes Nano-applications booklet

Description of activities and key stakeholders

The Rhône-Alpes Nano-applications booklet aims to

- Mobilize SMEs, which are not yet mature enough, to engage a collaborative R&D program with a public research institute;
- Provide a spectrum of business development activities and creative methodologies, to ensure the start-up of concrete innovation projects and which provide commercial success;
- Transform into technical specification the SMEs needs, in order to conduct prototype development and proof of concept.

A comprehensive and attractive booklet will describe the most relevant Nanotechnology applications and will be especially targeted to people in charge of the canvassing of the companies.

A working group will be set up at local level, with representatives of the cluster association and a representative of the Chamber of commerce. The first actor knows very well its own members and their needs, while the role of the Chamber of commerce is to support the mapping phase of all the companies involved in nanotechnologies.

Expected Impact

- Widened range of tools at disposal of research institutions for canvassing the SMEs;
- Raised awareness on nanotechnology applications among companies;
- Consolidate the existing detection mechanisms of SME's

Steps to implementation

- Stakeholders involved meet to agree on the concept idea and funding sources;
- Technicians from partner laboratories work to select the best applications and proceed to drafting the contents;
- The booklet is used in dissemination events and in coaching sessions with companies.

Action 2: Innovation cycle

Description of activities and key stakeholders

The Innovation Cycle is a methodology that will be implemented by Minalogic, with the support of the State and of the local authorities, to support the development of SME's addressing breakthrough innovations in order to avoid the loss of value, as high risks are not usually accepted by traditional SMEs.

Transforming a few high potential SMEs into powerful ISEs, relying on a gain of competitiveness will bring by:

- new usages of technology and societal needs,
- easier access to technologies available inside research institutes
- accompanying the SMEs in their launch on the market of high tech and high value products, a stage

requiring on-going capital.

This program will be part of the future Technical Research Institute in Nano electronics.

This action will rely on the mobilisation of all available networks and go-betweens to identify companies and needs for innovation; the booklet created in action 1 is used as a tool to canvass the SME's.

The needs and demands will then be "concentrated", rationalised by the Minalogic Cluster into comprehensive projects, to be realised on the technological R&D platforms, and funded through a dedicated scheme involving private and public funding.

Expected Impact

- Facilitated tech transfer to "traditional SME's" not used to technological innovation;
- Increased number of companies working with research institutions on Nano.

Steps to implementation

- Preparation and signature of an agreement between the stakeholders to determine the framework of the programme (actors involved, beneficiaries, funding etc.);
- Identification of projects and validation (go/no go);
- Support to SMEs all along the launching process of the new product: from the exploration until pre industrialisation (including go/no go phases).

4 - From needs to priority actions at trans-regional level

The seven actions selected at trans-regional level reconcile the needs and the expectations of all the KEEN-Regions partners, mainly related to ensure some benefits to each Region and to attest the feasibility of implementation.

When discussing about possible areas of collaboration between RDCs, partners agree it is worthy taking advantage of European funding opportunities to carry out joint projects. Moreover, they emphasize the need to put in place simple and concrete tools that can complement existing measures/schemes at local level, and that bring together research and innovation to address economic growth in the partner regions. An interesting opportunity is envisaged in the fact that each RDC can learn from the others in terms of identifying and putting in place already working programs or setting common tools for the benefit of the three regions.

Two types of action can be found in the following:

- Joint actions, to be implemented by two/three RDCs;
- Actions implying a joint effort to define a common methodology, which will be implemented individually in each Region afterwards.

4.1 Fostering research-business relations

Action 1: Shared common methodologies and tools to promote the use of Nanotechnologies among the companies

Description of activities and key stakeholders

As a consequence of the emphasis placed on the importance of communicating Nanotechnologies to the companies, several tools were conceived to be implemented at local level. Such tools, as for example booklets providing information on target industry issues, application sectors, opportunities and solutions, and coaching sessions for entrepreneurs, are not to be viewed just as a solution to some needs, rather as a pattern for approaching the companies.

When developing the concept idea of the tools dedicated to companies, KEEN-Regions will share a common approach/methodology, based on their best practices and previous experiences, as well as on new ideas. The involvement of the relevant partners and the exchange of their ideas and suggestions is expected to produce the most effective tools as possible. In particular, partners will work on defining two ways of approaching companies: a straight approach (face-to-face, guided visits, coaching sessions...) and a roundabout approach (multimedia, booklets...). Starting from shared approaches, each RDC will adjust them according to its specificities and will implement the actions following an independent schedule.

In order to work together from remote and to facilitate the exchange of information, a dedicated virtual group will be created. This social network will allow each member to be informed about others' initiatives in real time.

Expected Impact

- A common methodology to approaching companies in the Nanotech sector developed;
- New tools for the communication of Nanotechnologies to companies created;
- Exchanged sustainable best practices from partner regions and from external regions.

Steps to implementation

- Two separate committees, according to the two approaches, are set up;
- The virtual community is created with a view to facilitate the exchange of information and the submission of ideas;
- Each partner contributes to its committee through the common platform;
- Each partner adjusts and implements the agreed tools according to its local strategies, needs, and schedule.

Action 2: Web platform to match Nano-technology offer and demand

Description of activities and key stakeholders

A web platform in the KEEN-Regions area will help matching the demand of companies with the offer of technological providers. Suppliers and clients will interact in an easy and proficient way and good ideas will have the opportunity to be translated into technological innovations thanks to this virtual marketplace.

The platform will present a visible area dedicated to companies and a reserved area dedicated to researchers/scientists. In particular, the research centres recorded in the platform will contribute to updating a visible area dedicated to the most interesting applications of Nano and potentials for new products. A mapping of the equipment and infrastructures in each KEEN region will be made available in a reserved area, with the aim to foster the creation of a community of researchers willing to cooperate.

It should be explored the possibility to integrate and make use of EEN (Enterprise Europe Network) services, in particular establishing collaborations with the EEN regional contact points and the EEN sector group on micro/Nano technology.

KEEN-REGIONS partners will constitute the core group involved in the platform, and the participation of other research centres will be fostered.

Expected Impact

- Increased exploitation of research infrastructures in the KEEN area;
- Newly established collaborations between companies and research centres, both at local and at interregional level;
- New products developed and launched in the market.

Steps to implementation

- A MoU from each partner is collected, as well as a quantification of available resources;
- The technical management structure is defined but the partners;
- The concept idea for the platform is finalized and the web tool implemented;
- Each partner takes charge of carrying out communication activities to spread the use of the platform among the companies located in its territory, according to a common and agreed dissemination plan.

Action 3. Fostering the emergence of a “cloud cluster for Nanotechnologies”

Description of activities and key stakeholders

International collaboration among companies and research centres is emerging as a key factor to bring on innovation, to stay competitive and to enter new markets. It has been noted that the most efficient model implies players aggregating around some common interest and pushing for that. KEEN-Regions partners are willing to foster a bottom-up action from the companies and the clusters aimed at establishing transregional networks of strategic collaboration.

A virtual common space for companies and clusters, open to the exchange of knowledge and to potential collaborations, will be a flexible tool at disposal of proactive players. The “cloud cluster” will facilitate the spreading of new ideas, new activities and the capacity to innovate. The building of a constructive dialogue among cluster actors and the systematic exchange of information will be the pillars of this virtual space, in which local entrepreneurs and research centres will have the possibility to take advantage of common opportunities.

Expected Impact

- New transnational collaboration projects set up;
- Companies’ competitiveness enhanced;
- Local development fostered.

Steps to implementation

- KEEN-Regions partner clusters explore the interest from associated members to profit from the advantages of the “cloud cluster”;
- In case of a positive reaction, the concept idea and the implementation plan is developed;
- Some light tool to put in contact clusters, companies and research centres at transnational level is set up;
- The “cloud cluster for Nanotechnologies” is open to non-KEEN clusters.

Action 4. Coordinated impact in Nanofutures platform

Description of activities and key stakeholders

KEEN-Regions partners will coordinate their participation within NANOfutures, a European Technology Integrating

and Innovation Platform with a strong technological component, supported by the European Commission. The aim of such coordinate effort is to transfer the pleas emerged in KEEN-Regions project, actively participating in the relevant Working Group, Technology Transfer and Innovation Financing.

The partner acting as a broker toward the community will be Veneto Nanotech, that will explore all relevant possibilities for transferring the KEEN-Regions results to the Nanofutures community.

Expected Impact

- KEEN-Regions RDCs more connected and organized at the EU level;
- KEEN-Regions results widely disseminated through Nanofutures.

Steps to implementation

- Veneto Nanotech takes contacts with the coordinator of the platform;
- Possible solutions to widespread KEEN Regions results are explored;
- Registered partners are able to post news and events in the platform;
- Partners agree to inform each other when they are participating in events organized by Nanofutures.

4.2 Generating new ideas

Action 5. Lay the foundations to develop Key Enabling Technologies in KEEN Regions area, placing the focus on end users and on design applications targeted to their specific needs

Description of activities and key stakeholders

Many of our regional partners from industry and research have been actively involved in the High Level Group on Key Enabling Technologies which handed in its report to the Commissioner Nelly Kroes in June 2011. We followed their work with much interest. There is general will to take advantage from the outputs of the HLG. However, the conditions and processes to be set up from the report still have to be discussed between the partners.

In order to be ready when the processes will be defined, target sites will have to be identified. These are places with a real knowhow in nanotechnologies. Sites in our three regions could pretend to be identified as target sites for KET's (maybe 5 in Rhone-Alpes, 3 in Italy and 2 in Spain). Subcontractors shall already be identified and organized in clusters in each region through the help of European funding, which would come from the funding sources identified or set up from KEEN. Thus, when the first technologies will come out of the pilot lines in the target sites the subcontractors will be ready to integrate them into products or to sell them.

Expected Impact

- Enhanced cooperation on nanotechnologies between the three KEEN Regions beyond the project;
- Established focus for the development of nanotechnologies in the three regions in accordance with the

KET's recommendations;

- Innovation alliances created.

Steps to implementation (long term)

- Get organised for watching the follow-up made by the Commission after the HLG report on KET's (funding etc.);
- Identify target sites in each region;
- Identify subcontractors;
- Create joint R&D projects with target products matching directly to the subcontractors needs.

Action 6. Idea's day in...motion

Description of activities and key stakeholders

The concept of the Ideas Day in Rhone Alpes will be extended to the other KEEN regions, with the aim to organise in the Basque country and in Veneto a similar event. The Ideas Day is a forum for sharing projects and ideas dedicated to innovation Nanotechnology issues, enriched by the approach of other skills and other world visions such as art, design, human and social sciences. This day is mobilizing around the key players in industrial innovation, students and researchers, society. By combining the looks, cultures and skills, IDEAs Day offers the opportunity to participate in a discussion on issues related to innovation, questioning the links between industrial and societal issues. The Idea's day fosters co-creation of new products for the benefit of society, paying special attention to the demands of the market.

The Idea's day in the three regions will focus on providing understanding of innovation management and how to do in practice. Dedicated activities will put in evidence the needs of the local industry and the promotion of the local know-how. Starting from the Minattec Ideas Lab initiative, KEEN-Regions partners will share a common model to be implemented at regional level. Each region will invite the other partners to present their competencies and contributions during the day, as well as their success stories. Research partners from the KEEN-Regions will lead the initiative, with the proactive contribution of the business and the public partners. Every 2 or three year a "special idea's day could be organised in one of the three KEEN regions in cooperation (cofunding also) with the partners of the other regions.

Expected Impact

- Collaborations between non-conventional actors and Nanotech research units triggered
- Raised awareness on Nanotechnologies among society at regional level
- Increased trans-regional exchanges between researchers belonging to the three RDCs

Steps to implementation

- A transnational scientific committee to define the orientations of the Idea days in the different regions is set up;
- A MoU for the periodic invitation of KEEN-Regions partners is signed;
- Each RDC takes charge of collecting the necessary resources for the organization of the event in its Region on an annual basis;
- Partners from the Keen regions are invited to the next Idea's day in Grenoble (in 2012 or 2013). Co-construction and cofunding of this event by the three regions.

Action 7. Benefiting society through the Eranet scheme

Description of activities and key stakeholders

Developing common projects is important for the sustainability of the KEEN partnership and it helps to enlarge the partnership and to find the best opportunities. The Eranet scheme is a valuable solution for pooling local resources and investing them in a joint initiative. Therefore, an Eranet project proposal will aim at coordinating the research efforts of the participating Member States and Regions to support highly innovative industrial research projects. KEEN-Regions partners are willing to reach a critical mass of companies, thus they will support the presentation of a proposal under the Eranet scheme with an open topic (i.e. smart cities), with nanotechnology playing its part as an enabling technology. Such approach is expected to generate significant benefits to the companies, the technology providers and society in general. Industrial priorities will be targeted.

The stakeholders involved in the proposal submission phase will include the Regional authorities and the financial agencies of the KEEN-Regions, as well as new Regions and States with a lively nanotechnology sector.

Expected Impact

- Enhanced trans-regional research-industrial cooperation on topic addressing societal challenges;
- New academia-business partnerships established;
- Society benefits from innovate projects transferring knowledge into industrial technology applications.

Steps to implementation

- Since the 2007-2013 programming period is coming to an end, KEEN-partners will develop a concept for a joint proposal to be submitted in the next programming period 2014-2020.

4.3 Valorising the human capital

Action 8. KEEN partners jointly apply for Marie Curie Actions: Initial Training Networks (ITN) and Industry-Academia Partnerships and Pathways (IAPP)

Description of activities and key stakeholders

In order to foster trans-regional mobility of researchers, KEEN-Regions partners will jointly apply to Marie Curie actions in the coming calls for proposals. The aim is to foster research-research and research-business mobility, as a means to valorise the human capital in the three Regions and to encourage fruitful exchanges between the partners involved.

For the purposes and the composition of the partners, two actions have been identified:

- Initial Training Networks (ITN): universities, research centres and companies submit a proposal with the aim to recruit and employ eligible researchers or host them, and provide specialised training modules to early stage researchers;
- Industry-Academia Partnerships and Pathways (IAPP): universities, research centres and enterprises submit a proposal promoting strategic research partnership with a strong mobility element. The funding covers exchange of know-how through two-way or one-way secondments of research staff between the commercial and non-commercial partners.

Expected Impact

- Transnational public-private partnerships in Nanotechnologies settled;
- Early-stage researchers trained and specialised;
- Knowledge creation and knowledge transfer between innovative academic and leading-edge industry partners.

Steps to implementation

- Involved partners define a common specific topic of interest;
- A mapping of companies working in the specific field in the three regions is carried out;
- Mapped companies are asked to express their interest in hosting researchers and participating in the project;
- Whether results from the mapping exercise and the request for partnership declarations in the three regions are negative, partnership expands to other regions.

Action 9. Gateway for research careers in the KEEN area

Description of activities and key stakeholders

Sharing information on researcher's mobility programmes, calls and vacancies is an easy and concrete way to

foster the mobility of researchers in the KEEN-Regions area. The partners will use the KEEN-Regions platform as the location to post vacancies and funding announcements. The platform may be modified accordingly. Partners will also give visibility to the others partners' calls and announcements whenever convenient.

Expected Impact

- Local opportunities for researchers' mobility get wider visibility;
- Bilateral mobility between the three KEEN Regions is enhanced;
- New trans-regional collaboration opportunities are created.

Steps to implementation

- The platform administrator verifies the possibility to add an app for advertising mobility opportunities;
- Once the platform is modified, partners update the contents of the new app;
- In order to enlarge the impact of the action, KEEN partners involve other local research institutes encouraging them to post their own vacancies on the platform.

5 - Recommendations from the Advisory Group

Public funding for nanotechnologies

- Future policy actions should focus to provide appropriate framework conditions to better commercialize and exploit R&D findings and Nanotech inventions, moving from fundamental towards market-driven research.
- Regional support measure should be very tailor-made and fill fields not addressed on national or European level. Regions can easily focus on increasing framework conditions that are often not addressed on national level. Framework condition could range from education / training over financial aspects until regulatory conditions.
- A wish-list for public funding for R&D projects would include:
 - IPR landscape studies. It makes no sense to carry out R&D just to notice that the technology has been “mined” with patents around it so that you can only utilize the unique technology you created if you pay for licensing.
 - Market studies (at least small scale). It makes no sense to carry out years of R&D just to notice that even if you manage to cover all the relevant market in the world, the market itself is so small that it would not justify the development work.
 - Prototyping, as the first step towards commercialization;
 - Process development. Process efficiency, reliability and reproducibility are clearly connected with successful commercialization. In addition, at a phase when a company transfers from pilot phase into establishing large scale production it also faces its largest risks. Thus, finding a solution on how public funding instruments could support process development would be of crucial importance.
 - Networking, tailored matching. Contacts to potential customers and other companies are needed to understand the customer needs, to get critical target markets know-how, to carry out open innovation projects, and to allow mentoring and peer-to-peer support. To allow all this, a public funding program could include project coordination services which provide networking and matching.
- Public funding programs giving an incentive to projects that see to substantial collaboration between R&D institutes and companies are advised. Substantial can be translated as having more than 20% of the overall project budget residing at the R&D institute.
- Policy measures to support user-focused projects and research activities carried out in conjunction with users would definitely stimulate the generation of marketable ideas. A continuous open call for proposals could attract the best ideas and it should be flexible enough to allow different proposals to be funded.
- When supporting technology development, regions should be opportunistic. It is recommendable to think carefully which technologies (to be developed) would support improving the local industries’ global

competitiveness the most; or which technologies would match the local skill sets and core competences best, allowing further improvement of the local competence pool into an internationally attractive hub.

Public procurement

- To foster utilization of innovative public procurement, necessary education and support should be available for the civil servants. "Regional new technologies agents" should know all the local start-ups' and SMEs' technologies, and if possible also carry basic understanding on the core competences of the local research groups. The "Agent" should also have basic understanding of public procurement rules and legislation. With this skill set, the "Agent" should systematically visit all local infrastructure decision makers (hospitals, schools, elderly care centres, city officials, regional economic development officials, etc.) and introduce the relevant technologies. It is an imperative to approach the decision makers in customer oriented mode; not selling all the region has but focusing on the customer needs.
- Improving visibility and communicating well is key for public procurements that request the development of innovative products (like not buying a bridge but a solution to pass a river). This would have a huge impact on local innovation activity.

Network opportunities for nanotechnologies

- The cluster approach is a very powerful tool to promote fruitful cooperation between the triple helix actors. Clusters and cluster policy has to be considered as one tool within a regional or national STI strategy. All measures supporting Nanotech and its commercialisation have to be closely linked among each other.
- Making high quality business support available in all phases of commercialization is a top priority for prompting nanotechnology in business. The current level of business support provided by the local R&D facilities bound tech transfer offices may not be enough. A good idea could be utilizing service design to avoid "innovation support jungle" and to create a professional communications strategy to make sure all the relevant stakeholders really know what they can get from local support - either via a cluster, or from some other organisation.
- Joint Technology Undertakings like ENIAC and ARTEMIS for nano-electronics and embedded systems target this relationship as well and they are focussing on public private partnerships in a tri-partite construction. Regardless, the overall recommendation is to assess the future economic value for the private partners that contribute, as a clear focus for future sustainable growth and European based employment.
- Key Enabling Technologies and the HLG report indicate that a sustained support throughout the Valley of Death is essential. Regions might have to come up with sustainable strategies to give support in the Technology Readiness above level 4, probably up till level 7 or 8. This is fairly new playing field and flat rate approach in Horizon 2020 is not yet at par with this view.

Research-business relations

- Increasing the impact of research-business partnerships requires basic understanding of two issues: what we sell, and to whom we sell. Thus, firstly it should be studied and well documented what the local research groups do (i.e., the core competences and a suggestion which industries could utilize it). Secondly, it should be studied what does the local industries core mass include. With combination of these two information packages it is possible to start identifying the most beneficial enabler (i.e. nanotechnology) – customer – combinations. As these linkages have been identified, it is simply about tailored matching (and promotions) of these two groups.
- “Regional new technologies agents” is an interesting profile to be supported in the local context. The “Agent” should know all the local start-ups’ and SME’s technologies, and if possible also carrying basic understanding on the core competences of the local research groups. In addition to visiting public bodies, the “Agent” should systematically visit local industries. In fact, it is an imperative to approach the company decision makers in customer oriented mode; not selling all the region has, but focus on the customer needs. Practical examples on this kind of work, with positive feedback, exist in Finland.
- The most important issue in commercializing nanotechnology is focusing into business issues. This includes marketing and strategy, good business plan, IPR taken care of, the right team (including business know-how and target industry know-how), involving target customers into the process as early as possible, partners with critical technology expertise or target industry know-how, focusing on the application’s needs and your own solutions, and considering costs and ROI. These topics are however no “rocket science” and can simply be educated, even to the nanotechnology researchers. It is clear that a talented scientist seldom is a talented businessman, but if the scientist knows even the basics of commercial issues, the interface between technology and business might be smoother. In addition, the basic know-how on commercialization issues would widen the researchers’ skill sets and make them more desirable labor to the local industries. If the target is to commercialize new know-how more efficiently, it might require a change of culture; it is time to consider the basics of innovations and commercialization as basic civilization of all European academics.

Opportunities for young entrepreneurs

- Start-ups should be raised into the whole research community’s awareness; a professional communications strategy (articles, prizes, etc.) how to bring them into public awareness is recommendable. For positive prospects, commercialization prize could be one approach. The competition should include submission of ideas (to the evaluators with NDA) and a related documentation of the IPR and commercial prospects, even a business plan if possible. The winner should gain a lot of publicity via e.g. launching co-incidentally with some big local event. In addition, the winner should get all relevant business support including fine tuning the business plan, patenting and VC contacts.
- An overall stepped program, with small starter projects (limited time, limited funding), which may grow on proof of early success, is apt to support start-ups. It both limits the financial funding exposure, and puts the

starters into a communication/reflection relation with public authorities. As of the second step (just after early seeding money) a clear necessity of private risk funding to obtain any further public funding is advised.

- Innovation support provides a lot of business opportunities for the service providers, thus it should be carefully considered, which are the services the public sector to be active in. Entrepreneurship friendly society should support private business and not compete with it via publicly funded, overlapping services. On the other hand, if the services are purely private, they might be too costly to be available for those who really need them; consider for example education to business skills. Thus the most important topics such as local business support and incubator services should be, if not completely organized, at least assured by public bodies. Hybrid models utilizing both private service providers and public funding might be worth considering. For example, the quality of business support might improve if the companies could get an “incubator ticket” which allows them to get publicly funded/supported incubator services from a relatively freely chosen source. In addition, the contacts to potential customers, i.e. multidisciplinary networking and tailored matching to customer industries should be supported just to make sure it will be available. This service is often provided by Clusters, thus it should be considered should the local cluster’s activities be at least partially publicly funded.
- Spin-offs in the nanotechnology sector should be encouraged. Targeted schemes and actions (public or private funded) could provide:
 - Basic education to business skills and commercialization, combined with high quality business support
 - Local technological support, e.g. access to local R&D infrastructure
 - Education to in-house innovation management, especially R&D project management
 - Contacts to other companies
 - mentoring and peer-to-peer support (Entrepreneurs’ club, Cluster etc)
 - potential customers (Cluster, other support organisations)
 - Funding
 - contacts to local angel investor community and/or seed funding from public sources
 - contacts to VC, combined with education how to approach VC
 - to process development
 - Up to date information and contacts considering nanosafety issues and relevant, upcoming regulations.
- For some of the Ph.D grant systems, a grant extension period can be offered as transient to spin-off/start-up initiatives. A full chain of support systems starting at Ph.D. grant support up till young innovative companies support programs is another way to promote an entrepreneurial attitude in young researchers.
- Small manufacturing companies play a key role in Nanotechnology. There are no Nanotech-based products if they can’t be manufactured precise enough and to marketable prices. Thus, small manufacturing companies shall be supported in gaining appropriate knowledge, infrastructure and manufacturing technologies in order to become able to manufacture accordingly.

- There are technologies which simply need a long time to become mature enough for any relevant commercial application. The only way to make the time shorter is to assure the resources; 5 men working full day in 2 years is faster than 1 man for 10 years. Thus rapid commercialization requires organization and means to identify the most potential technologies and to provide funding for these. However, at the same time it requires professional project management to follow up the progress, and courage also to stop the project if it becomes clear that it is not going to deliver.

Generation of innovative ideas

- The open innovation paradigm can facilitate new ways to generate innovations by which internal and external researchers can work together and they will be willing to collaborate sooner. In addition, open innovation means involving end-user and partners in the innovation process from the very beginning. Matching industrial needs with scientific capabilities is a very promising way to close the gap between industry and academia.
- SME's seldom have all the relevant know-how in-house, and thus would benefit from all forms of collaboration. Thus open innovation platforms should be worth considering. The preferred open innovation model includes joint development of a prototype or an application, however also idea generation and licensing a technology or a solution developed by a partner would be desirable.
- Living labs, in commercializing nanotechnology, would at their best provide unique opportunities to get feedback from the users. A well-organized living lab serves also as a piloting environment, allowing proof of concept data for marketing and convincing the investor candidates. In addition, at its best it would also make a show room and door opener to new business sectors. Thus, recognizing any potential living labs or piloting environments would be recommendable. These should include for example publicly funded infrastructure projects which are anyway going to be built – consider if there is a change to “speak in” nanotech SME's or start-ups with relevant products. Utilizing living labs however needs careful planning of the following issues in advance (to avoid common wolf pits)
 - how the user feedback and/or measurement data is gathered to allow relevant statistics
 - how the results will be documented and turned into relevant material (brochure, data sheets)
 - how the facility will do after the project funding has finished? Is there a stakeholder to whom the facility is important enough that it is willing to pay for any management, corrections, etc issues in the future.

Valorization of human capital and researchers' mobility

- Awareness campaigns pointing out advantages of starting an own company, combined with specific institutional and programmatic support measures can convince researches to become their own boss. Also, entrepreneurial support schemes motivating researchers from academia to become entrepreneurs, are a good option.
- Very high quality research is always the way to attract more talent. In addition, good resources like high quality research equipment could attract the researchers. Thus the basic resources of local researchers should be

assured. Furthermore, soft landing services, like service to find an apartment (and handle all related issues), support to get to know the local community and find a job for the following partner would help.

- Awarding PhD-grants for people employed in a company, sustained by an academic sponsor, is a concrete way to build bridges between research and business and to increase the innovation potential of the company.

Raising awareness about nanotechnologies

- Nanotechnology centres should have a communication approach to local media (newspapers, local TV channels, seminars, newsletters, web pages), and more importantly, identify which could be the local, most interesting nanotechnology success stories and news to be communicated to the media.
- In order to raise awareness among companies, one or more industries which could benefit from the local nanotechnology companies' products and researchers' know-how should be identified. Tailored events where the key SME's are invited to pitch (include coaching for pitching especially in researchers are allowed to speak!), should be organized. The events could include tailored marketing materials and small scale exhibition, and support in building up joint projects if interesting opportunities are identified.
- Success stories, fairs with specific focus on Nanotech applications, Used-Supplier clubs and cluster organisations are appropriate tools to raise awareness on nanotechnologies among companies.
- If you would like to increase the positive awareness of the general public and you wish it for long term, than you should turn to the public relations and the most important target groups are the children and the students.
- The general public should be targeted communicating success stories on nanotechnologies and bringing the issues of small companies creating jobs and their products providing societal benefits (like decreasing the number of stomach flu cases in local elderly care centre, avoiding bankruptcy of an old company by new added value). However, simultaneously it should be told how the safety and responsibility issues have been considered.
- Societal challenges should be properly addressed in relation with nanotechnologies. In order to foster acceptance by the public, this new technology should be presented just as an enabler, useful to achievements for the benefit of society.

Use of research equipment from the companies

- The companies using the research equipment at publicly funded infrastructures may have very different needs, for example random needs, e.g. occasional need for measurements with special tools, outsourcing R&D, outsourcing the pilot production of the future spearheads, analysing the performance of the equipment when considering to buy the (same) equipment to their own facility in case of success, business completely based on the equipment at the public infrastructures. The last three ones would be the most beneficial and desired forms of collaboration. Before any corporation would consider outsourcing parts of pilot production, it typically

requires years of other, successful collaboration with these companies. Successful implementation would also benefit from smooth access, for example organising the research infra into a foundry.

- To support creating start-ups based on access to research infrastructure requires an entrepreneurship encouraging atmosphere within the research group. In addition, successful implementation requires a clear model and agreements model how to do it; for example the start-up could use the equipment after office hours and at weekends, with a fixed and tolerable prize. In addition, the young entrepreneurs should be allowed to act as part time researchers at the university when kicking off companies, just to assure their living etc.
- It is possible to encourage the use of research infrastructures by the companies foreseeing such costs as eligible expenses in R&D&I projects.

Transnational cooperation

- The key issue in durable transnational joint initiatives is added value; if both the transnational partners get something unique and useful which is not available without the partnership, the initiative is durable. The challenge is to identify these complementary skills to be shared – avoid joining competing or too similar initiatives.
- It is highly desirable for companies to express their needs for transnational initiatives, in order to make the best out of them. These needs can be triggered by exposure to transnational opportunities, in which joint events/conferences certainly play an important role. Other initiatives like Enterprise European Networks are just another instrument.