

PROJECT FINAL REPORT

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4.1 Final publishable summary report

4.1.1 Executive summary.

Nanotechnology is an area which has highly promising prospects for turning fundamental research into successful innovations. The potential applications of nanotechnology are wide-ranging and rapidly increasing, demonstrating a field that has the potential to act as a powerful catalyst for economic development.

To gain a competitive position in this exciting terrain and to foster industrial innovation, EU research infrastructures require more and more resources: multidisciplinary competencies, investments for up-to-date technical equipment, skilled human resources and strong links to the business community. 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.

Within this framework, **KEEN Regions has aimed to accelerate and enhance the innovation process and the research development of three nanotechnology clusters located in Veneto, the Basque Country, Rhône-Alpes**, by means of building up stable and synergic collaborations and exploiting the complementarities between the research driven clusters, improving links between regional authorities, research entities and the local business community, maximizing the use of research infrastructures and developing a Joint Action Plan for Nanotechnologies.

The project has implemented a three-step approach (mapping and analysis of existing resources, interactive exchanges and mutual learning, and a focused integration process) **leading to a Joint Action Plan**, developed by all interested stakeholders. In this regard, **KEEN Regions has tested a creative approach for joint planning of regional innovation strategies**, aimed at delivering a strategic analysis at policy level on perceived needs and feasible solutions in the three partner regions.

KEEN Regions partners have been working in close contact with an Advisory Group, a committee of advisors from four European countries, which has provided a valuable contribution to the success of the project.

Following a bottom-up philosophy and utilising the direct involvement of key regional stakeholders, the JAP ensures a feasible and comprehensive implementation after the end of the project. The document includes the priority actions set for each partners, and highlights the potential synergies and collaboration activities that have been identified. **Thirteen actions at local level and nine actions at trans-regional level have been included in the JAP.** Along with the actions, a set of policy recommendations has been formulated according to seven topics relevant to nanotechnologies, and ten best practices described as examples.

Throughout the project, a **web platform (KEEN-borg)** designed to facilitate solutions matching, has provided opportunities of collaboration for researchers and businesses. The platform has been used also as a vehicle for disseminating KEEN Regions results and the organisation/participation in international conferences has enhanced the visibility of the project.

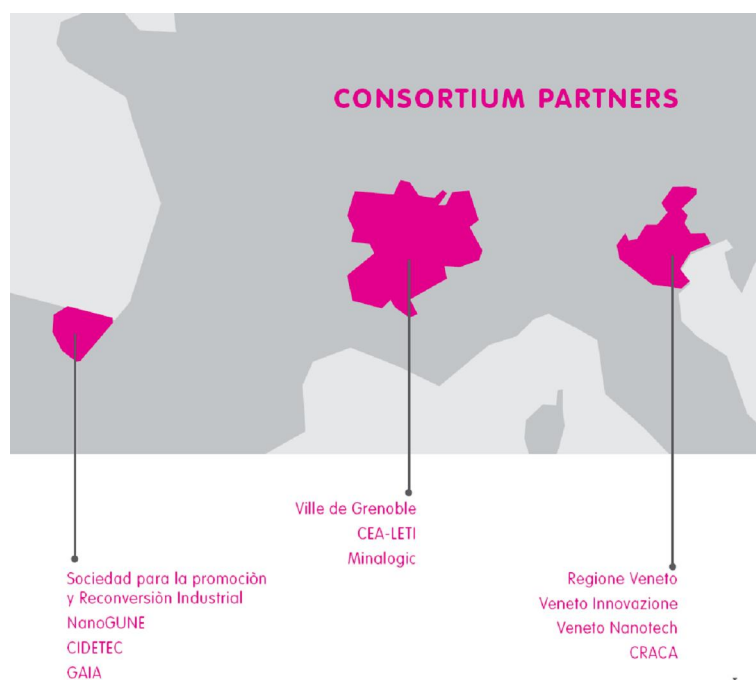
4.1.2 A summary description of project context and objectives.

Nanotechnology is a very promising area for the future of European knowledge-based economy, as the potential applications are broad and the impact for the local economic development is high. Anyway to gain a competitive position in this exciting field, it is mandatory to have excellent research infrastructures, multidisciplinary competencies, investments for up-to-date technical equipment, skilled human resources, and strong links to the business community. This is the reason why many well-established research centres in Europe are working in research-driven clusters, aggregating key-players such as researchers, competitive companies and public authorities.

The **cluster model is apt to the nanotechnology sector**, as it is based on innovative research, it often needs the support and the investments from the public side and it benefits from developing strong links with the business community to ensure its sustainability in the long term. Clusters striving for excellence need to enhance their openness to external collaborations if they are willing to stay competitive, enlarge their network and exploit complementarities with other clusters. Moreover, wider competences are needed to innovate traditional manufacturing sectors, to launch new ones and more generally to boost the regional economic development.

Veneto, Grenoble and the Basque Country present a basic similarity: the development of nanotechnology clusters has been strongly fostered and sustained by the Regional Administrations, with the aim of directly connecting nanotechnologies with the local traditional manufacture sectors, widely spread in these areas and representing the privileged demand side for nanotechnologies. The three clusters together control more than 500 Mú public investments, 4000 researchers and 250 laboratories, but they are specialised in different sectors. As a consequence, their collaboration can become the engine for new and growing synergies, creating a huge potential for research and economic development. As far as the business side is concerned, though their economic structure is rather different, with Veneto and the Basque Country's local economies being mainly based on SMEs and Grenoble's on large industries, **all partners decided to focus on the opportunities nanotechnologies have to offer to SMEs** with the idea that, in a global competing scenario, micro and small enterprises need a better support focused on information and technical support, which are essential to sustain the innovation and the quality of the traditional productions.

KEEN-Regions has been implemented by a consortium of 11 partners, representing the triple helix. The public side, involved in the definition and implementation of research and innovation policies, was represented by four partners: some of them, **Regione del Veneto** and **Ville de Grenoble**, are local authorities while others are development agencies, directly involved in the management of such policies (**Veneto Innovazione**, **SPRI**). The research side was represented by a French public laboratory of micro and nanotechnology (**CEA**) in Grenoble; a research centre in the Basque Country addressing basic and applied world-class research in nanoscience and nanotechnology (**GUNE**) and a



representative of an alliance of technology research centres focused on nanotechnology (**CIDETEC**); and the organisation managing a comprehensive group of nanotech research facilities (**Veneto Nanotech**) in Veneto.

On the companies side, the consortium has involved an association of SMEs consortia in Veneto (**CRACA**) and two organizations representing the company within research driven clusters, **GAIA** in Spain and **MINALOGIC** in France. These business entities are directly involved in the development of the local clusters with a special focus on the exploitation of nanotechnologies. In fact, MINALOGIC gathers resources from the industry, research and education in the fields of micro nanotechnology and embedded software, GAIA is a member of ENIAC, the European platform of nanotechnologies and of the Directorate of GENESIS, the Spanish technological platform in Nanoelectronics and Smart Embedded Systems, and in Veneto CRACA represents enterprises of the mechanics, rubber/plastic and fabrics, clothing and footwear sectors, which represent the traditional manufacturing sectors addressed by KEEN-Regions.

The general objective of KEEN Regions has been to accelerate and enhance the innovation process, through the establishment of stable and synergic collaborations among the three nanotechnology clusters, maximising the usage of research infrastructures and fostering relations between the research and the business actors. As a consequence, **KEEN Regions has intended to increase the overall capacity of regional players in Veneto, Grenoble and the Basque Country in enhancing science and technology-based development, pushing collaborations among their nanotechnology research-driven clusters.**

In detail KEEN Regions has aimed to:

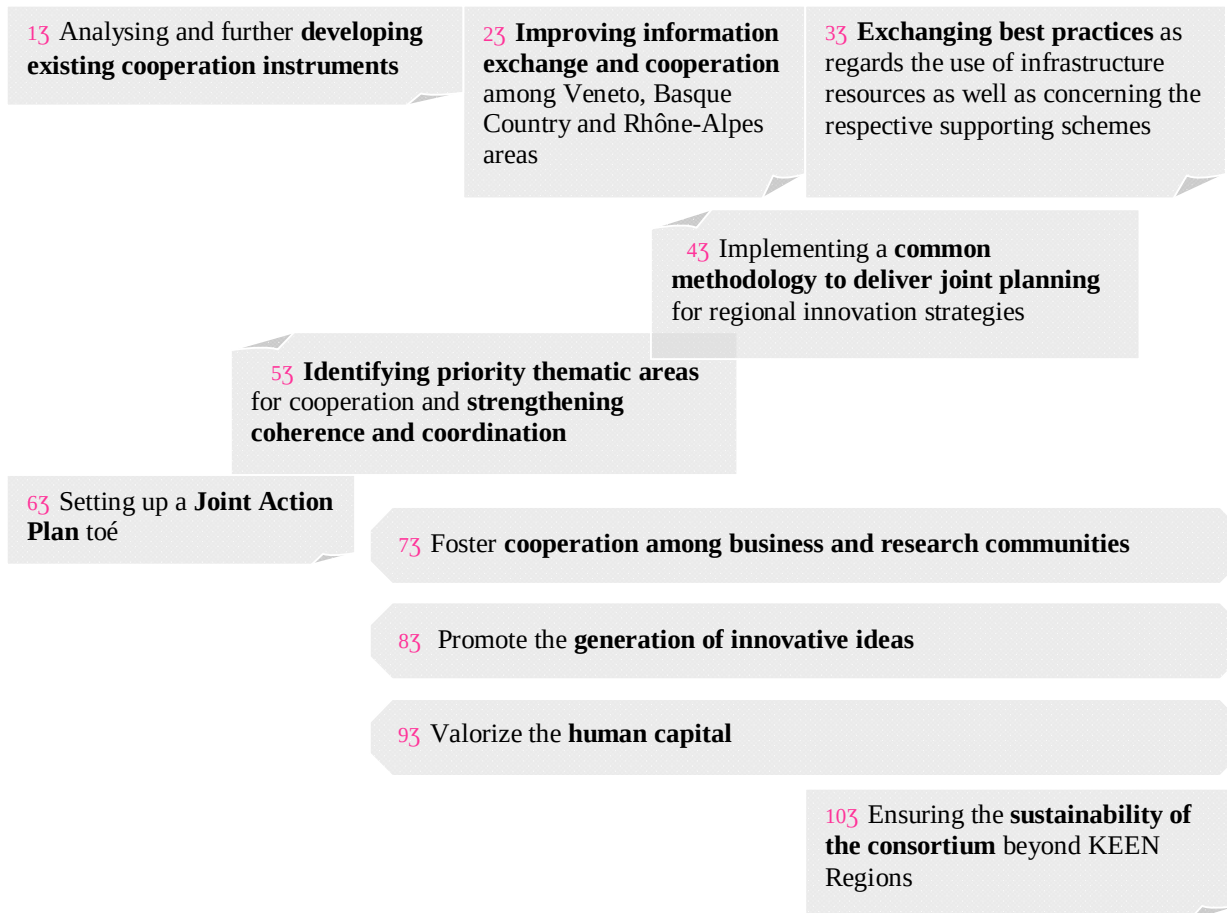
1. Enhance transnational, interregional mutual learning through:
 - a. Mapping and collecting information about the mutual potentialities
 - b. Building of relationships and deepening the mutual knowledge through learning visits
2. Improve links between regional authorities, research entities and the local business community through:
 - a. Fostering the cooperation and the integration among actors in order to build common practices and initiatives
 - b. Highlighting the best practices running in each cluster, and defining their transferability
 - c. Enlarging the linkages through the involvement of four associate areas
3. Foster transnational co-operations in areas of common interest through:
 - a. Identifying concrete topics for integration
 - b. Co-operating to develop and implement some common initiatives
4. Develop a joint action plan at the European level through:
 - a. Performing a technical feasibility assessment
 - b. Developing a Joint Action Plan (JAP)
 - c. Defining the JAP's economic sustainability.

The whole work plan has been design to lay the ground for the Joint Action Plan, in order to agree on concrete actions and schemes and to assure a consistent collaboration between the partners. Technical and network-building tasks have been complementing thinking sessions at local and at transregional level, out of which a set of proposals for action has been made.

Throughout the project, the emergence of the topic of smart specialisation on one side and the increasing attention devoted to KETs on the other side, have requested to refocus some of the objectives of the project. In particular, along with the maximization of the use of the research infrastructures, partners have agreed that encouraging relations between researchers and companies, and ensuring the sustainability of the results of the project beyond its end are core objectives for the

partners to keep working together on future lines of action and for the benefit of their local communities.

Therefore, objectives and methodology of the project could be represented in ten steps:



4.1.3 A description of the main S&T results/foregrounds.

KEEN Regions developed a smart methodology based on three steps (mapping and analysis of existing resources, mutual learning and research driven integration). The project has been aimed at delivering a strategic analysis at policy level on perceived needs and feasible solutions in the three partner regions. A bottom-up approach has marked the whole process leading to the setting up of a Joint Action Plan.

1 STEP: Mapping and comparing local resources and infrastructures to ease reciprocal knowledge between partners

KEEN Regions partners initially undertook a **mapping and analysis phase to recognize their own knowledge resources and research infrastructures**. Having a clear picture of what is going on at local level in the nanotechnology sector was a preliminary step for each partner to update on its own resources and to get information about others' experiences. A structured questionnaire for the relevant research centres in each region was designed so as to gather quantitative data on

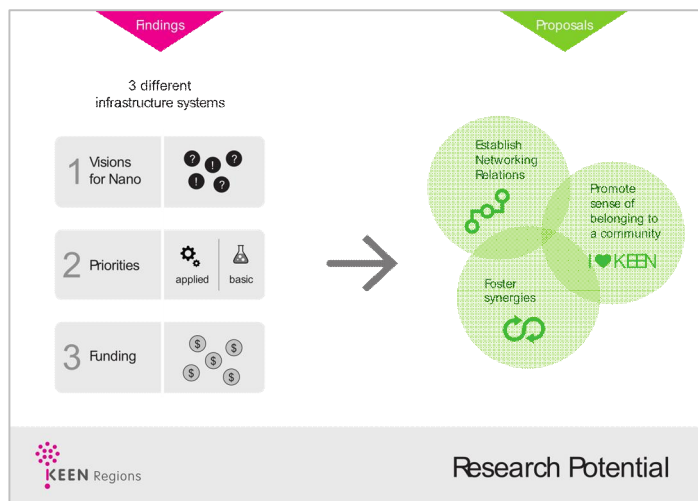
- scientific personnel profile
- research potentiality
- equipment
- expertise

and to determine the research focus of each centre. Overall, thirty institutes and laboratories in the three regions were assessed to get an overview of the research potential: in detail, facilities, equipment, researchers/technicians, financial resources, research potentialities and international collaboration initiatives were investigated.

The three RDCs presented 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). 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.

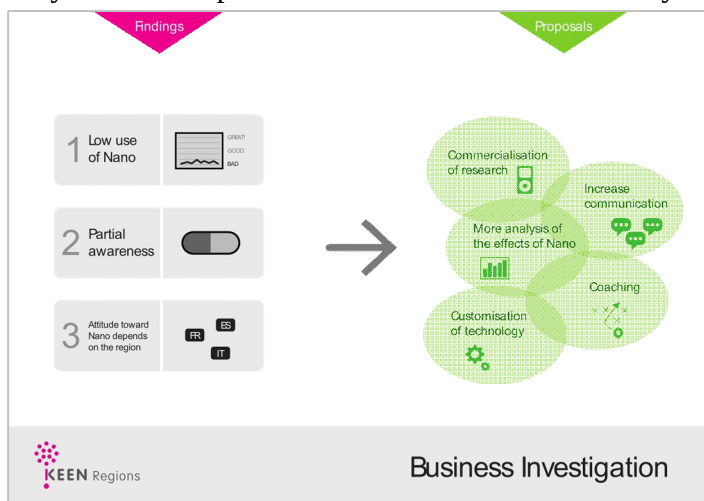
As a consequence of their significant differences, it emerged that a sectorial approach would have only partially benefited the involved RDCs. **It was agreed instead to work on common problems and needs, adopting a horizontal approach.** The main proposals concerned

- the setting up of tools to establish networking relations,
- fostering synergies and promoting 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.

Secondly, partners representing the business side undertook an **investigation to explore the business context and the approach of companies towards nanotechnology**, revealing their perceived problems and needs. Overall, results of questionnaires submitted to clusters' members 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 then included tools for

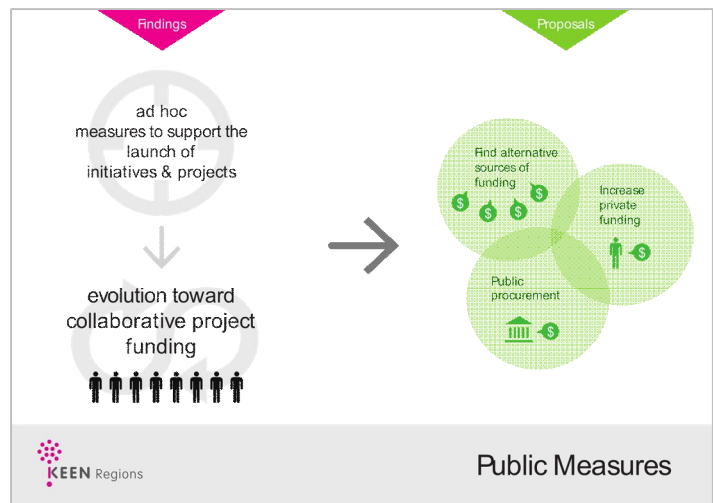
- increasing positive awareness among companies on the effects and applications of Nano,
- promoting the commercialisation of research, by means of customizing technology according to the needs of the companies and offering targeted coaching services.

Thirdly, an **analysis of the existing policy measures** allowed to get acknowledged of other partner regions' policies, financial schemes, regional development plans and research agendas for the development of nanotechnologies. 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.

As a result of the analysis, in Veneto a mix of European, national and regional sources granted the set-up of the Italian technology cluster for nanotechnologies (2003), and the related research infrastructures and equipment. Notwithstanding business collaborations with companies and the sponsorship of a local bank for the organisation of the business competition Nanochallenge, public funding remains crucial to support the cluster activities. In the Basque Country a clear vision was developed through the launch of the nanoBasque strategy (2008) and the establishment of CIC nanoGUNE. Several regional programmes support the research infrastructures and fund collaborative projects between companies and research centres, with the aim to extend the use of nanotechnologies to traditional sectors. In Rhône-Alpes, Micro and nanotechnologies are a major research focus and massive investments from the public sector come from both the national and the regional level. Development has been fast since Minatec was established (2002). Nanotechnology is also largely supported by the private sector, as Rhône-Alpes hosts the most important industrial cluster in France in the field of Micro-electronics and nanotechnology thanks to the presence of big companies.

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



Finally, a **SWOT analysis performed by each RDC** on the basis of data previously collected allowed further comparison between the different areas and the identification of possible complementarities. Despite some clashing differences, mostly concerning the amount and size of industries engaged in nanotechnology and the visibility of Nano-related activities at local/international level, potential areas of improvement and possible complementarities between the three partner regions were detected:

- Advanced R&D conducted in research centres has to be transferred smoothly to SMEs and to the market, research-to-business cooperation surging as a fundamental topic,
- Awareness about nanotechnology applications has to be raised among the business community, so as to create a dynamic critical mass of companies at local level,
- The three research driven clusters can learn to optimize and take advantage of international collaboration opportunities and projects.

STEP 2 i Mutual learning

In parallel with the mapping and analysis phase, the partners got to know each other better adopting a mutual learning approach. This phase moved from the idea that promoting mutual knowledge is an essential condition to foster joint participation and collaboration between project partners by means of improving links between regional authorities, research entities and the local business communities. Recognising that people communicate better on an individual level, one such mechanism was to develop personal networks for the trading of knowledge.

3 in-site visits were conducted in laboratories and research institutes located in the partner regions.

Key players and local stakeholders presented the policies and the clusters' governing structures, the laboratories, the facilities and the core research lines. These visits have intensified the exchange of information between the partners since the beginning of the project, their mutual knowledge

- 3 **2009 November 18-20** i Venice and Padua, Mutual Learning Visit in Veneto
- 3 **2010 April 28-30** i Grenoble, Mutual Learning Visit in Rhone-Alpes
- 3 **2010 July 28-30** i Bilbao and San Sebastián, Mutual Learning Visit in the Basque Country

and the building of interpersonal relations.

26 transferable best practices on nanotechnology initiatives, programmes and funding schemes were identified by the partners. A transferability plan, providing the necessary information to assess if the best practice is transferable and how to import it, was aimed to give suggestions to the partners concerning possible new actions. Also, the exchange of the best practices resulted very useful for selecting the common topics of interest for future developments at local and at transregional level. In particular, three macro-topics of common interest were identified by the partners:

- Fostering and improving the cooperation among research and business;
- Stimulating the generation process of innovative ideas;
- Supporting the development of an instrument for the international mobility of researchers.

For each macro-topic, a best practice was identified as a 'yardstick' to get inspiration from in the integration phase.

Personalized Coaching for SMEs (fostering and improving the cooperation among research and business) was a best practice offered by CRACA in Veneto to bring companies closer to the nanotechnology field. The MINATEC IDEAs Laboratory (stimulating the generation process of innovative ideas), is a public/ private initiative, established to develop useful applications for new technologies, located in Grenoble. CEA offered the best practice. Finally, the Ikerbasque model from the Basque Country was selected as the yardstick for the topic 'supporting the development of an instrument for the international mobility of researchers'.

The mutual learning phase was complemented by an **external study on the public perception of nanotechnology**, not only in some partner regions but with particular regard to other dynamic countries in this field (i.e. US and Germany). The outcomes of the International Context Analysis contributed to define a horizontal approach to communication and dissemination issues, applicable to the actions included in the JAP.

The study argued that exploring how nanotechnology is publicly debated, advocated and contested helps to suggest how policy makers can proficiently approach 'technology decision' without overlooking the involvement of the general public. Three dimensions of the societal context of nanotechnology development must be considered (public perception, media narratives and patterns of public engagement mechanisms), setting the frame in which policy makers normally act.

Firstly, **perceptions from the general public are influenced by many variables**. Overall, the general public is unfamiliar with nanotechnology. Although citizens who have a positive view of the future impact of nanotechnology on their life outweigh those who have a negative view, a majority is unsure about what these impacts will be. Their opinions on technology are affected by the knowledge of the social context in which (Nano)technology is embedded, rather than on technical knowledge per se. Socio-political risks, like unfair access, rich/poor divide, privacy, loss of jobs, terrorist and military use of nanotechnology rank higher among citizens' concerns about nanotechnology than possible adverse health and environmental consequences. Thus, citizens are concerned about the socio-political framework of innovation (who is involved, who is responsible, what are the goals of these policies) equally, and probably more, than the assessment of toxicological or ecotoxicological risks.

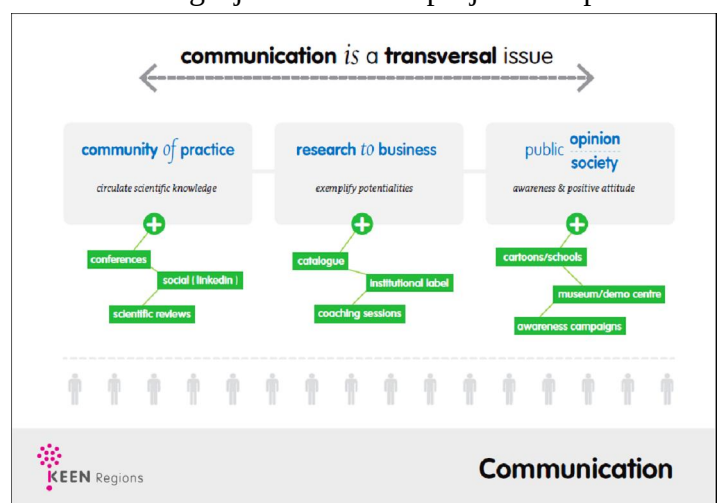
Secondly, **mass media coverage contributes disseminating a positive image of nanotechnology**. Though nanotechnology media coverage is actually suffering a declining trend in quantitative terms, it appears overwhelmingly positive. Existing research on media narratives of nanotechnology are seemingly diffusing an overall positive image of nanoscale technologies and science, by emphasizing the benefits over the risks and by linking stories reported in the news to inherently positive frames like scientific or economic progress.

Finally, the study argues that **public engagement in nanotechnology policy must not be afraid of controversy**. Public engagement mechanisms in the technology decision-making process are

commonly limited to public consultation and one-way communication, with nonorganized stakeholders as principal targets. The acknowledgment of ethical, legal and social aspects of nanotechnology has brought the attention on the importance of the participatory process. Though participation is often assigned the ambitious goal of creating consensus and legitimacy for technology decisions, thus fostering social acceptance, the complexity of technology debates challenges the efficacy of such approach. Reframing the goals of participation in terms of social learning, by means of stimulating participants to rethink solutions, value systems, worldviews, priorities and problems, is a viable alternative.

Taking cues from the International Context Analysis, KEEN Regions partners reflected upon the need to boost communication of nanotechnologies at a transversal level to reach all target groups with different goals and different means. It resulted that:

- **Communication inside the research community** is not fluid enough: several chances to cooperate and valorise synergies (for instance through joint research projects or purchase committee) are missed and the researchers at both local and transnational level could be better connected;
- **Communication towards the business side** is not effective: entrepreneurs need to see and understand how nanotechnologies could solve their problems;
- **Communication towards the public opinion** is insufficient: there is the need to develop a positive attitude towards Nano among the public, in order to get people accustomed to this technology.



Several solutions to overcome these communication barriers have been proposed by the KEEN-Regions community and afterwards included as agreed initiatives in the Joint Action Plan.

For instance social media and internet-based tools have been recognised as a powerful instrument to intensify the cooperation and share information among the available equipment. Demo centres, communication campaigns and cartoons (see for instance minalogic.komunsens.fr) have been proposed as useful tools especially to raise the awareness of the public opinion and to make the "nano-world" close to children.

STEP 3 i Research driven integration

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 research driven clusters.

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. Each group adopted its own methodology of work to come out with concrete proposals for action. **WG1 on SMEs i Research Relationship: How to foster the use of research infrastructure for SMEs** gathered GAIA, Minalogic, CIDETEC, CRACA, SPRI, and NANOGUNE. The working group started off from the conclusions of the analysis phase, which detected an insufficient cooperation among researchers and business actors and poor awareness on potentialities of the nanotech sector in the KEEN Regions. As a first step, WG1 participants proceeded to classify companies according the activities carried out in R&D. This classification

proved necessary to envisage alternative ways of approaching nanotechnologies for SMEs and to foster their collaboration with research centres. In light of the elements collected, two main recommendations were given by the working group:

- dissemination activities for industries focusing on innovation related to Nano need to be adjusted according to the type of audience. In the dissemination strategy, the following issues are key:
 - Nano is an Enabling Technology,
 - Nano needs to take care of the image: not green, etcé ,
 - Nano is a breakthrough.
- alternative ways to maximize the use of research infrastructures and to improve the SMEs-research relationship need to be investigated.

The members of this WG went through case studies in the three regions and also benchmarked some case studies abroad like the Israeli one. From all these case studies, they defined a set of actions to increase fruitful cooperation between SMEs and research.

CEA led **WG2 on Creativity/Art & Sciences methodology application**, a group working on defining a methodology for fostering the generation of new ideas. Participants in WP2 were CEA (Minatec Ideas Lab - MIL), GAIA, Veneto Nanotech, and Ville de Grenoble. Minattec Ideas Lab was chosen as a good practice in this field. Instead of adopting a theoretical approach to discuss about policies and programmes, partners chose to set up a project idea to use existing technologies for new applications in the field of lighting and to use this simulation process as a way to draw useful proposals for action. Visits and meetings were helpful in getting partners know each other's technological expertise and defining common objectives. Minattec Ideas Lab was assigned the task of identifying the technological and design requirements for the implementation of the project in different locations, each with its own specific constraints. The locations had to be able to provide opportunities for giving demonstrations and to serve as a technology showcase.

The project was broken down into four stages:

- Brainstorming by those interested in the project;
- Identification of stakeholders essential to project implementation and possessing skills or equipment superior to those used in the KEEN Regions project. This stage highlighted the need to attract talented young students and researchers in design schools, and to involve not only designers in the applied research and experimental development work, but also integrators and other companies capable of implementing the project in a real-world context;
- Identification of project sites; the partners selected three sites particularly conducive to local involvement;
- Project fund raising, for both the research and on-site implementation (in-situ demonstration) phases.

The concept idea stemming from the simulation of an idea generation process allowed drawing some general considerations:

- A demand-led approach is key to stimulate innovation in the nanotech sector,
- Research partners often possess the technology but they need to adapt it to create marketable products,
- Companies willing to share the risks with research partners and having the potential for commercializing the product offer some guarantees on the relevance and innovative potential of the idea,
- Once investors understand the benefits of developing the technology or promoting the product, event, or location involved, they become actively involved in sharing both the costs and innovation-related risks,
- A strategy to develop research-business partnership for sharing technological advancements and innovation-related risks has to be put in place,

- Project fundraising activities result a complex task, and synergies among public funding and private sources of funding need to be exploited.

WG3 on Joint Mobility schemes gathered Veneto Innovazione, Veneto Region and SPRI (the owner of the Ikerbasque best practice). Once considered the vast potential impact of improving incoming mobility policies in the KEEN Regions, concrete measures to improve the foreign researchers' attraction capabilities of regions were considered the focus of the working group. The methodology of work was split into two main activities:

- A desk research, aimed to collect and analyse the regional policies in the KEEN regions for attracting foreign researchers and other experiences in top performing EU regions;
- Brainstorming on proposals for action which could be included in the Joint Action Plan at local and transnational level.

The proposals of action were developed in order to present several opportunities of improvement for all the KEEN partners both individually and synergically and to allow other regions, interested in developing a local strategy for researchers' mobility, drawing some useful ideas and food for thoughts.

Overall, 22 individual actions (15 at local level, 7 at trans-regional level) were suggested by the three working groups.

The discussion moved then at regional level, with key stakeholders involved in the identification of the actions that suited the local needs and the eventual proposition of new ones. Three regional meetings were organized to select those actions that partners considered most beneficial for their local area and for trans-regional cooperation, and provided the main content for the SDL and SDT (Strategy Development at Local level, Strategy Development at Transregional level).

3 2011, November 3 ĩ Venice, Regional meeting
3 2011, November 4 ĩ Bilbao, Regional meeting
3 2011, November 7 ĩ Grenoble, Regional meeting

The selected actions at trans-regional level were the object of a Foresight exercise, where partners and Advisory Group members engaged in a thinking exercise to add new elements and to provide a significant direction for the JAP. Partners defined the expected benefits for their region and the feasibility of implementation of the trans-regional actions. As a consequence of the exercise, partners agreed to develop more actions aimed at reinforcing areas perceived as most promising and beneficial for all.

The Advisory Group

The AG, a KEEN Regions supporting body, collaborated with project partners in different stages of the project implementation, with the aim to improve the knowledge base and to widen the impact by means of including regions outside the partnership. The AG was involved in the following activities:

- Foresight exercise (providing an external point of view and a fresh input on possible ways and tools for joint collaboration);
- Policy recommendations and suggestion of external cases for the JAP;
- Participation and contribution in the final conference.

The AG members were identified accordingly to their vast experience in managing funds and programmes for RTD activities in their countries and they brought to the discussion different approaches. Members of the AG were representatives from VDI-VDE IT (DE); Culminatum (FI); IWT (BE); Gedeon Richter (HU).

The final outcome of the project, the **Joint Action Plan**, sums up all the work done and the decisions taken during the third phase (research integration). Besides, a technical feasibility of each action helped clarifying their implementability, tracking the barriers and the recommendations for better implementation (D4.1 Recommendations Report). 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 research driven cluster, and highlights the potential synergies which have been identified throughout the project activities. It

also includes a set of policy recommendations and case studies collected from the Advisory Group members, according to the main topics of interest in the nanotechnology field, and more generally to the three macro-topics identified by the partners.

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 specializations 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.

Proposals for local action in 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.

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.

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

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 labò format.

Expected impact:

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

Action 2: Nano-package for companies

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 advised on how to adapt an existing nanotechnology application or to undertake a new research development.

Expected impact:

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

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

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.

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.

Action 4: e-NanoMarketplace

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.

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.

Action 5: Nanotech Demo centre in Veneto

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.

Expected impact:

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

Action 6: Programme ñBusiness gains brainsò

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.

Expected impact:

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

Proposals for local action in the Basque Country

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 in the mid-2000s 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 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. 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 KEEN regions 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 researcher, 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

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.

Action 2: Knowledge Map of Nano-technology offer

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.

Expected impact:

- Facilitated identification of the research institutions for specific requests;
- Increased research-industry collaboration.

Action 3: Equipment for nanotechnology reference book

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

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.

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

The action aims to incorporate a private data collection and monitoring system in a 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.

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.

Action 5: Nanotech showroom

The idea of the proposed activity is to give more visibility to all the developments made in the Basque Country in the field of nanotechnology, using the BTEK, the Basque Technology Interpretation Centre of the Bizkaia Technology Park. Not only scientific discoveries by the technological agents but also by companies will gain visibility, and target groups will include students, but also other companies and entrepreneurs.

Expected impact:

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

Proposals for local action in Rhône-Alpes

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, environnementé), so that the existence of a dynamic critical mass at local level represents 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

The action is a Nano-applications booklet aimed 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.

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

Action 2: Innovation cycle

The Innovation Cycle is a methodology 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.

Expected impact:

- 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.
- Facilitated tech transfer to "traditional SME's" not used to technological innovation.

Proposals for action 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 was worthy taking advantage of European funding opportunities to carry out joint projects. Moreover, they emphasized the need to put in place simple and concrete tools that could complement existing measures/schemes at local level, and that brought together research and innovation to address economic growth in the partner regions.

Trans-regional actions fostering research-business relations

Action 1: Shared common methodologies and tools to promote the use of Nanotechnologies among 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. 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, bookletsé). Starting from shared approaches, each RDC will adjust them according to its specificities and will implement the actions following an independent schedule.

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.

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

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.

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.

Action 3. Fostering the emergence of a ñcloud cluster for Nanotechnologiesò

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 ñcloud clusterò 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;
- Companiesò competitiveness enhanced;
- Local development fostered.

Action 4. Coordinated impact in Nanofutures platform

KEEN-Regions partners will coordinate their participation within NANO futures, 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.

Expected impact:

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

Trans-regional actions supporting the generation of 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

In order to be ready when the KETs 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.

Action 6. Idea's day iné motion

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 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 Minatec 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.

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

Action 7. Benefiting society through the Eranet scheme

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.

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.

Trans-regional actions 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)

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: ITN and Industry-Academia Partnerships and Pathways (IAPP).

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.

Action 9. Gateway for research careers in the KEEN 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.

To sum upé JAP at local level

Research-business relations

The research-business relationship is characterized by a low utilization of nanotechnology from the industry, which is mostly a consequence of the scarce awareness of nanotechnologies and their applications. Besides, companies are often not aware of the technological offer in their region and they do not know which actors to turn to. Finally, it takes long time to turn the results of R&D into products, so the interest of investors has to be stimulated by presenting them a clear picture of advantages and opportunities.

Solutions

- increase companies' awareness on nanotechnologies,
- map the capacities available in the region related to Nano to get a clear picture of the local context,
- attract and foster the use of nanotechnologies by driving companies of different productive sectors in their processes or products, prompting the industrialization of nanotechnologies in the whole value chain of suppliers,
- foster the use of equipment and research infrastructures,
- support companies in finding technological solutions to their needs,
- transfer big technological advances achieved in laboratories to small to medium companies likely to bolster their competitive advantages.

Actions included in the JAP

- Knowledge Map of nanotechnology offer
- Nano-applications booklet
- Equipment for nanotechnology reference book
- Directory of Basque companies with micro-nanotechnology activities
- Rent equipment and a research team for your business!
- Nano-coaching for entrepreneurs

Generation of innovative ideas

It sometimes happens that excellent research results do not find a commercial application and they are left in a box. Several reasons are behind that. Often, researchers act independently from a business counterpart, delivering unexploited research results. On the contrary, companies may have good business ideas without the technological know-how. Entrepreneurs and researchers should be given access to easy tools to work and generate marketable ideas together.

Solutions

- encourage a user-driven innovation approach engaging companies and the society,
- foster the matching of demand and offer with an open innovation approach, likely to increase the generation and concretization of business ideas,
- support structural projects that aim to promote nanotechnologies for SMEs.

Actions included in the JAP

- Nanotech Demo Centre
- e-NanoMarketplace
- Innovation cycle

Valorization of the human capital

The innovation's factor is human capital. Because of their size and low capacity, SMEs sometimes lack the vision or the money to invest in talents, which would certainly bring innovation into their business.

Solutions

- public funding supports the recruitment of highly-skilled personnel in companies,
- Universities and research centres can benefit from mobility of research personnel towards companies when flexible contractual tools are used.

Actions included in the JAP

- Programme «Business gains Brains»

To sum up JAP at trans-regional level

The actions selected at trans-regional level reconcile the needs and the expectations of the KEEN Regions partners, mainly willing to ensure some benefits to the respective local systems and to attest the feasibility of implementation. The actions reflect the will of the KEEN Regions partners to implement joint activities which enhance the sense of community among the three nanotechnology regions and to lay the ground for further collaborations. KEEN Regions partners will:

Increase transnational collaboration between research centres and companies

- sharing common methodologies to communicate nanotechnology to the companies and to raise awareness
- among the public,
- working on an open innovation tool to match cross-regional demand and offer for technological solutions,
- fostering international collaboration among companies and research centres through the valorization of the
- integrated role and services of clusters,
- making efforts to give visibility to KEEN Regions results.

Support the creative process for delivering innovative nanotechnology ideas

- jointly collaborating in future Key Enabling Technologies programmes,
- organizing joint initiatives for sharing ideas and practices,
- working together in the next programming period to submit a multidisciplinary Eranet project, targeting societal challenges with the support of nanotechnology.

Increase the mobility of researchers in the KEEN Regions area

- jointly applying to Marie Curie Actions,
- sharing information on vacancies for research staff in partner research centres.

Actions included in the JAP

- Shared common methodologies and tools to promote the use of nanotechnologies among companies
- Web platform to match Nano-technology offer and demand
- Fostering the emergence of a ñcloud cluster for nanotechnologies
- Collaborative projects to develop Key Enabling Technologies
- Idea's day in é motion
- Benefiting society through the Eranet scheme
- Coordinated impact in Nanofutures platform
- KEEN partners jointly apply for Marie Curie Actions: Initial Training Networks (ITN) and Industry-Academia Partnerships and Pathways (IAPP)
- Gateway for research careers in the KEEN area

Policy recommendations from the Advisory Group (AG)

The organizations forming part of the Advisory Group were selected because of their strong interest in nanotechnology both at research and at policy level. Also a fair geographical balance was looked up. Each associate organization appointed a representative who took part in several project activities: Ms. Eeva Viinikka (Culminatum Innovation), Ms. Zita Zombori (Gedeon Richter), Mr. Francis Deprez (IWT Flanders), Mr. Gerd Meier Zu Köcker (VDI/VDE Innovation).

Since their involvement after the first project period, the AG members were requested to carefully study all the analytical documents produced and they were constantly kept updated on the project progress. Starting from the outcomes of the working groups, several transversal topics of interest for policy makers were identified and submitted for further reflection to the AG members to come up with policy recommendations and useful case studies/best practices to be shared with the consortium. Overall, policy recommendations could be aggregated in seven categories:

- Public funding for nanotechnologies;
- Research-business relations;
- Generation of innovative ideas;

- Valorization of human capital and researchers' mobility;
- Raising awareness about nanotechnologies;
- Use of research equipment from the companies;
- Transnational cooperation.

Also, AG members provided ten case studies, providing a short description and the lessons learned from each of them.

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.
- The complete wish-list for public funding for R&D projects would include:
 - IPR landscape studies;
 - Market studies;
 - Prototyping;
 - Process development;
 - Networking, tailored matching.

THE CASE: SHOKs, new kinds of strategic networks for businesses and research

SHOKs or Strategic Centres for Science, Technology and Innovation is a new funding instrument in Finland for engaging companies into research. SHOKs carry out long-term cooperation in fields most crucial for Finland's future. The results are breakthrough innovations of global importance, which can be agilely transformed into growth in business life and well-being in society. The 6 SHOKs (Energy and the environment, Metal products and mechanical engineering, Forest Cluster, Health and well-being, Built environment innovations and Information and communication industry and services) are private companies owned by the most important related stakeholders, including universities, large corporations and even SMEs. The mission of these companies is to jointly carry out long term research tailored for these strategic industries' needs. Public funding is provided by Tekes, the national funding organisation for applied research in Universities and industrial R&D. Simplified, as the industry partner invests 1 man year for the R&D work, Tekes provides funding for another man year subcontracted from the university partner. There are programs within the SHOKs where only part of the owners participates, and the IPR is shared by the project participants.

Lessons learned: The most efficient method to ensure industrial participation in R&D projects is to let them identify the needs, and to make it obligatory for the academia to include industrial partners to get the R&D funding.

For info check: <http://www.shok.fi/en>, www.cleen.fi, www.fimecc.com, www.forestcluster.fi, www.salwe.fi, www.rym.fi/en, www.tivit.fi/en

- Regional support measures should be very tailor-made and fill fields not addressed at national or European level. Regions can easily focus on increasing framework conditions that are often not addressed at national level. Framework conditions could range from education/training over financial aspects until regulatory conditions.

THE CASE: Subsidy systems supporting cross regional collaboration and research infrastructure usage

In Flanders, several subsidy systems for cross regional collaboration open to SMEs are available, ranging from minor initiatives up to large scope projects. Financial stimulus has triggered SMEs that by themselves had never taken the step. Firstly, there is the stimulus to work together with a registered research institute, regardless whether it is situated in Flanders or abroad. A 10% subsidy is granted as soon as 20% of the overall accepted budget is spent at the research institute(s). There is a ruling that research institutes of own region prevail if they have a similar offering, but the cases up till now have indicated that on many occasions this open support has stimulated SMEs to look both outside their own company and even abroad. A second stimulus is provided for collaboration with companies abroad. Again, 10% extra subsidy is granted if there is substantial cross border collaboration with other companies (partners in a project).

The rationale behind is the covering of costs companies incur in travel and remote collaboration. The stimulus is there to enhance vertical integration of SMEs in European networks.

Lessons learned: The Flanders financial stimulus is a basic implementation of the principle 'you get what you pay for'. Not only networking and networking support should be focused, but subsidy systems should also be tuned towards incentives to drive companies in the desired direction.

- 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 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.
- To foster utilization of innovative public procurement, necessary education and support should be available for the civil servants. Regional new technologies agents with high-qualified profile 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, focusing on the customer needs.

Research-business relations

- 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 and partners with critical technology expertise or target industry know-how.

THE CASE: ERANET OLAeplus. A success story of setting up business-research relations

Flanders is involved in the Organic Large Area Electronics project (ERANET+) via its industry support program (applicants need to be companies). IWT passed on a message to all research institutes (including universities) that have a technical offering in the field that the call was coming and that they had to trigger companies to apply. So the research institutes were positioned in the driving seat, activated by a 10% subsidy bonus. In a field in which it was taken that only few SMEs and companies were available in Flanders, they were able to set-up 12 projects with international collaboration within a time frame of 4 months. Enabling the future contributors just worked. It stimulated academics to contact businesses and coming out of their comfort zone.

Lessons learned: There are a good many people at universities and institutes that have the right attitude and approach to set up relations when triggered. Especially if a readily program is attached.

For info check: www.olaepius.eu

- 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.

THE CASE: DSP Valley, Flanders. Stimulating innovation by enabling new cooperation and new partnerships
Public private partnerships to enhance cross regional programs can be improved through dedicated non-profit organizations that focus on improving networks and collaboration programs. Those nonprofit organizations are emerging out of the sector and get financed both by membership contributions of related companies as well as by public funding. DSP Valley is one of those non-profit organizations in Flanders. It is an independent technology cluster focusing on the design of hardware and embedded software technology. DSP Valley groups more than 60 members: universities, research institutes and companies, from small start-ups, over SMEs to large international groups with a local R&D activity. DSP Valley offers its members a networking platform that allows them to explore each other's expertise and that stimulates innovation by exploiting complementarities. The benefit of this policy is that, being a private

organization, they have more flexibility to expand their radius across borders. Their size can easily be tuned to the sector needs.

Lessons learned: Rather than erecting new structures, carefully watching the sector and stimulating and boosting one's initiatives is an asset.

For info check: www.dspvalley.com

- 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 CASE: Optoelectronics Research Centre (ORC) in Finland. Creating start-ups based on access to public R&D equipment

The optics research centre at Tampere University of technology has a good tradition in supporting the creation of start-ups based on access to research infrastructure. The results include spinning out about 10 photonics related SMEs. At Tampere, the local city has actively participated the encouraging policies. The model has been employed for 20 years successfully. The ORC offers an entrepreneurship friendly atmosphere at the university. The ORC culture entails the young entrepreneurs act as part time researchers at the university; this is to assure living and not to inhibit the interest to take personal risks like kicking off a company. The agreement model between the university and the company may include for example access to use the university equipment for the start-up after office hours and at weekends, with a fixed and tolerable price.

Lessons learned: One of the barriers to commercialization is the price of relevant equipment and facilities. Smooth access to the existing infrastructures enables creating start-ups and allowing them to grow mature enough to build up their own facilities. Supporting start-ups entails an entrepreneurship encouraging atmosphere within the research group. In addition, successful implementation requires an activity model and agreement model on how to do it.

For info check: www.tut.fi/orc/

- 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.
- 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.

Generation of innovative ideas

- The open innovation paradigm can facilitate new ways to generate innovations. It means involving end-users 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.
- SMEs 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, 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 can also make a show room and door opener to new business sectors.

THE CASE: Finnish Hotel of Tomorrow project. Piloting environments and Living Labs

The Finnish Hotel of Tomorrow project is an example of a living lab and piloting environment. Haaga-Helia university of applied sciences and the partner Hotel Haaga created a project to co-incubate another larger scale hotel renovation. In the project two hotel rooms were completely built again utilizing new Finnish technologies; the idea was to act as a laboratory for new kind of collaboration, to provide a demo place and create a living lab. The local nanotech expert Culminatum was invited to identify and pull in potential nanotech companies; five Finnish nanotech companies were interviewed. When the hotel rooms were ready and launched, 200 Finnish hotel managers visited the spaces within 2,5 months. It is difficult to imagine how any start up with 3 employees could make 200 new sector customers to see the proof of concept in 50 working days in some other way.

For info check: www.fhot.fi

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 and entrepreneurial support schemes, can motivate researchers to shift from academia to business.
- 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.
- Incoming mobility of top-level researchers contributes to shape the good reputation of universities and research centres, and to increase potential for innovation. The attractiveness of research and living conditions is essential to pull researchers from abroad. Therefore, the whole regional system should join their efforts to create a friendly work environment for foreigners, ensure high quality research equipment in the research centres and offer soft landing services.
- Existing programmes and tools for attracting talents in academia funded at European or national level can be profitably complemented at regional level. For instance, creating a regional fund for « ERC non-funded winning projects» or for supporting the sustainability of Marie Curie researchers after the end of their project is a valuable initiative.

THE CASE: Belgium i Attracting talents through ERC support initiative

ERC grants' procedures allow applicants to carry out their research project in whatever research institute all over Europe and the associated countries. Thus, the mobility element is a very significant one for this kind of research funding scheme and the best universities and research centres in Europe are attracting poles for talented researchers. Since the very first calls from ERC were launched, a funding issue emerged. Not all 'winning projects' were able to get funded from the ERC because of budget exhaustion. This trend is expected to be increasing in the next years, as the number of applications per call is dramatically rising (and so are the winning proposals) and financial resources do not increase proportionally. The Flemish community, through its Research Foundation FWO, offers each year to the best ranked Principal Investigators on the ERC Starting Grant reserve list with a host institution in Flanders, the possibility to start a research project financed by the FWO. The Belgium French-speaking Community offers up to 3.500€ to ERC applicant who pass the first step in StG and AdG, through its Fund for Scientific Research - FNRS.

Lessons learned: By providing alternative funding to ERC applicants that passed the threshold but were not funded by the ERC, the regional authority can contribute to enhancing the attractiveness of its Universities and research centres (more foreign researchers would be expected to apply for carrying out their research in those institutions where they know they will be funded anyway) and an increased number of incoming top researchers is guaranteed.

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 SMEs 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.
- Long-term positive awareness of the general public entails targeting groups like children and students.

THE CASE: NanoSchoolBox i Germany. Inviting kids on a journey into the nanocosmos

In order to draw students' attention to one of today's most exciting high technologies, the so-called NanoSchoolBox was developed. This baggage invites kids on a journey into the nanocosmos and is an outcome of the work of a German nanotechnology network, called NanoBioNet. The baggage contains 14 experiments that help to understand the effects of nanotechnology. Nowadays, the NanoSchoolBox is widely used in schools, mainly from class 9 (age 13) onwards - in chemistry and physics lessons. Some experiments are also suitable for biology lessons. The experiments can either be carried out by the teacher for demonstration purposes or by the students themselves in practical trainings or extracurricular workshops.

Lessons learned: Many approaches exist to make nanotechnology and its potentials more visible for the public. Kids in schools are a promising target group. Nowadays, there are enough tools and approaches available, however, teachers and adults must be open minded and motivated, too, to use such kind of tools, like the NanoSchoolBox. Networks, where industry, science and policy co-operate intensively can play an important role in contributing to a better public understanding of nanotechnology.

For info check: www.nanobionet.de

- The general public should be targeted communicating success stories on nanotechnologies and providing examples of small companies that create jobs and deliver societal benefits through their products. However, simultaneously it should be told how the safety and responsibility issues have been considered.

THE CASE: nanoTruck i Germany. Meeting place nanoworld

The mobile information campaign on nanotechnology "nanoTruck i Meeting Place Nanoworlds" of the Federal Ministry of Education and Research is aiming to get nanotechnology out of the laboratory to bring it directly to the people. It wants to provide the public with more information about the benefits and potential risks of nanotechnology at an early stage, promote their ideas and to show new perspectives for a successful career in an exciting and promising area of technology. Embedded in the federal government's High-Tech strategy 2020, it focuses on the generally understandable, clear transfer

of directly useful information about the principles, areas of application, opportunities and risks of nanotechnology.

The nanoTruck can be considered as one of the best approaches in Germany to bring nanotechnologies to the public. Initiated a couple of years before, the nano-Truck can still be rented and visited at different places in Germany.

Lessons learned: The key success factor is to generate a keen demand by using the right communication approach. The BMBF also benefits by the nano-Truck approach by providing continuously new prototypes and findings generated by publicly funded projects, which can be seen in the nano-Truck.

For info check: www.nanotruck.de

- 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, a means for the benefit of society.

Use of research equipment from the companies

- Companies may need to access the research equipment at publicly funded infrastructures for many different reasons. Therefore, they should be guaranteed a smooth access, for example organising the research infrastructures into a foundry.

THE CASE: MEMSFab - Finland. Accessing equipment within public R&D infrastructure organized by a private service provider

Public-private partnership can foresee deep and mutually beneficial collaboration between the local industries and local R&D infrastructure. Micronova is the largest publicly funded clean room facility in Nordic countries, also a joint facility of Aalto University and VTT. MEMSFab is a spin out company of VTT, also 100% owned by VTT. The company has an agreement that guarantees access to the research equipment in Micronova. External usage of the Micronova equipment, i.e., fulfilling the industries' needs, is taken care of by this company. Micronova already had long term collaboration with local industries, including some pilot production and even normal production agreements. However, creating the company has made the collaboration much smoother for industries.

Lessons learned: Smooth access to public infrastructures is one of the keys to improve public-private collaboration. However, it requires publicly available information on the equipment, rules on how to access and the implementation, including practical usage of the difficult and expensive tools, contracts, billing etc.

For info check: www.vttmemsfab.fi

- It is possible to encourage the use of research infrastructures by the companies foreseeing such costs as eligible expenses in R&D&I projects.
- 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 on 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, young entrepreneurs should be allowed to act as part time researchers at the university when kicking off companies, just to assure their living etc.

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 i avoid joining competing or too similar initiatives.
- Key factors are needs expressed by companies for transnational initiatives. 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.

4.1.4 The potential impact and the main dissemination activities and exploitation of results

As foreseen in the DOW a whole work package (WP5) has been devoted to the dissemination activities with the main aim to:

- 1-Share knowledge among the three research-driven clusters in order to build a "cooperation basis" to start the mutual learning and integration phases of the project
- 2-Spread the outcomes of the KEEN-Regions project to stakeholders and organisations outside the partners network

To better plan the communication activities and to focalise the key messages accordingly to the specific target, a detailed **communication plan** was set up (deliverable

5.3.1), the coordinated image produces and the project brochure (5.3.2) designed and distributed among the partners.



The **coordinated image** and the **brochure** were then the main tools used in the first part of the project to present KEEN-Regions and its goals to our key audience.

Beyond the WP5 activities anyway, along the whole the project, communication has been one core issue for the KEEN-regions partners.

The first communication goal (building the cooperation basis) was reached mainly through the exchanges and the meetings of the first period which set the basis to pool and

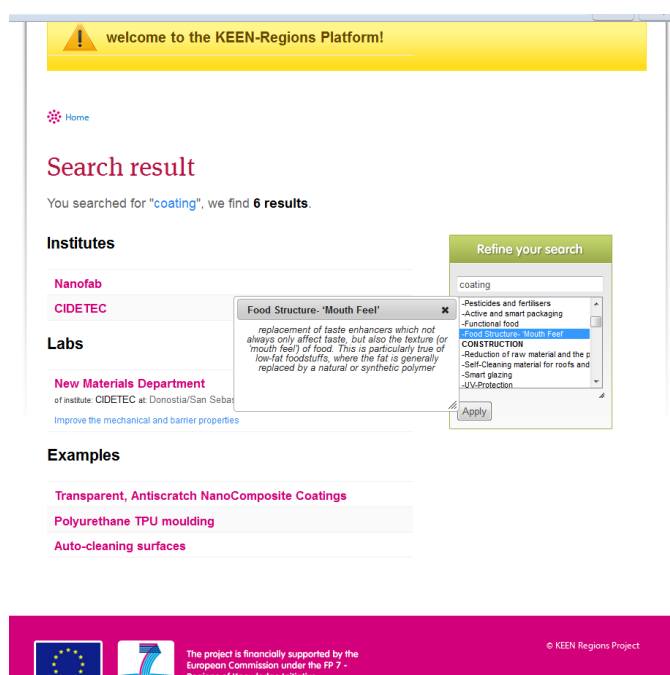
share information and knowledge among the clusters concerned and to make the involved participants a lively community.

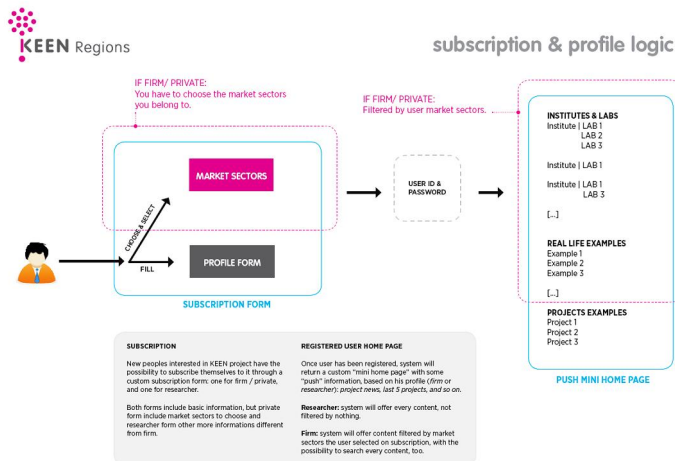
The mutual learning visits in particular, gave participants the chance to see and visit the facilities and laboratories, deepening the way in each cluster infrastructures, people and activities are structured

and carried on. In less than a year (from October 2009 to May 2010) **3 study visits** were organised in Veneto, Grenoble and Basque country and **more than 50 people** (partners, researchers and entrepreneurs) had the possibility to attend them.

In the meanwhile an analytical process was launched: **30 research institutes** and laboratories were assessed and their key competences tracked, the needs and the perception of **250 companies** were gathered through interviews and questionnaires. The data and feedbacks were circulated among partners and then included in the cooperation platform.

The **Keen-Regions platform** moreover was planned to disseminate this knowledge and ad hoc designed to promote the use of nanotechnology. To this aim an automatic





search engine was built and tested in order to deliver customised information accordingly to the user profile (researcher vs entrepreneur). The search engine in fact allows to connect researchers-researchers and researchers-entrepreneurs and to find out the "right" research centre as partner. Institutions, labs and their competences have been mapped and connected to their related market sectors. Registered users can search by needs and find the lab able to solve their problems as well as a case that shows concrete example of this solution. The challenge was moreover stimulating

entrepreneurs to imagine other possible applications of nano-technologies.

To increase the usability of the platform and to get the entrepreneurs closer to the research lab, an effort was made in order to translate the research results into concrete examples of nano-applications.



IT | Veneto
FR | Rhône Alpes
ES | País Vasco

Examples
Decorative and protective coatings

Images
This field shows all the images uploaded

Keywords
In the example "Decorative and protective coatings" the pictures attached show both the market product and the development process

Potential fields of application
This picture shows the innovative product described

Keywords
Two technology applications in the market

IT | Veneto
FR | Rhône Alpes
ES | País Vasco

Search results
Title and excerpt give a first idea of the example and are showed in the search result.

Examples
Enerfluide - Fluids and kinetic energy

Link to the Institute involved in the application achievement
Institute: CEA-LEI

Equipment/technology utilized
Technologies developed: Electrostatic material conversion, Electrostatic conversion

Research topics related to the example implementation
Associated research topics: Energy harvesting, Power or impact energy conversion, Very low consumption electronics, Operational optimization, Sensors network

Business sectors where the application could help
Potential fields of application: Wind energy application on very small scale and without important moving part, Fuel-powered fuel, Very low consumption electronic power supply, Industry in the control of power plant, Cooling operation

Keywords as links to the arguments described
Tagged as: Aircrafts, materials, energy, impacts, ICT

keen-regions.eu

A set of "key examples" were then edited and uploaded, trying to transfer in a straightforward and plain language the added value of the proposed solutions, accordingly to the enlightened business need.

Apart from the communication via web, the audience targets were reached, as foreseen in the communication plan and in the DOW, through specific **events and workshops**.

Companies were, in particular, the target of the **two matchmaking events**.

Differently from what initially foreseen, it was quite complex involving companies into such events because, as also previously enlightened, from the analysis emerged that several companies had only a small knowledge of the nanotechnology potentialities. Moreover some companies were reluctant into incorporating nanotechnology in their products and processes because of the health and safety potential negative impacts. This was the reason why some partners (see below in the table, in particular CRACA) devoted many efforts into organising **informative workshops** and **visits** for companies to the nano-laboratories in order to show the potentialities of the technologies and foster the dialogue and cooperation among research centres and companies (as listed in the dissemination activities list).

Due to this reason was also decided to involve in the matchmaking only companies with some previous experiences with nanotechnology.

During the project life two matchmaking events (deliverable 5.2.1) took place

- San Sebastian on July 28th 2010 (in conjunction with the MLV)
- Venice from 23rd to 25th November 2011 (in conjunction with the conference NanotechItaly)



NanotechItaly is an international conference annually organized in order to effectively promote and disseminate nanotechnology and its application in the industry world and also to establish a useful link among the scientific and academic world and the entrepreneurs actors.

In 2011 (from 23rd to 25th November) it took place in Venice and it was seen as a good chance to spread information on the KEEN-Regions project, involving in particular the public in a debate about the challenges and implications associated with nanotechnology.

In the frame of the conference (on November 23rd) in fact it was decided to organise a specific **KEEN-Regions workshop** **ñGovernance and development of nanotechnologies: a regional joint action planò** (see also the deliverable 5.3) to discuss in particular

the perception of nanotechnologies in

society and new forms of communication of nanotechnologies applications to the business community.

The first part was organised with speeches on the concerned topic. In this session the draft of the international context analysis (see deliverable 2.3) was also presented and discussed with the audience. In the second part a panel discussion was organised and moderated in order to have a view of all the stakeholders involved in KEEN-Regions: researchers, policy makers, representatives of the business community, members of the advisory board. The panellists were fostered to share and discuss their different views and perspectives on the actions for the Join Plan.



The other important event organised was the **final conference**. As foreseen in the communication plan, the conference focused on the policy makers audience with the aim of sharing the methodologies and steps taken in preparing the JAP with policy makers outside of the KEEN-Regions area. To this aim and to stimulate the uptake of joint initiatives among neighbouring regions and countries in light of upcoming programming period 2014-2020, it was chosen to discuss the KEEN-Region methodology as a possible way to select its own "smart specialisation".

Therefore the sessions were organised in order to mix the traditional idea of a final conference, presenting the project's results, with a forward-looking approach, intended to stimulate the interest and the involvement of the target audience. The project's results were as well presented as in line with the smart specialisation concept and the approaching new instruments.

The KEEN Regions final conference was held at the Committee of the Regions premises on April 17th, 2012. The location was indeed mainly chosen for the high credibility and visibility it would have ensured to the conference. Thirty-five among regions, regional agencies and local authorities were represented, with around 70 attendants.



Another target group deeply involved into the KEEN-Regions communication activities and consistently informed about the project outcomes was the **Advisory Group**.

It took part into the project activities since November 2011, not only giving feedbacks and insights to the Joint Action Plan (as previously mentioned) but also animating and participating to the public workshops organised (both the workshop during NatechItaly as well as the final conference) in the project frame and spreading the outcomes outside the partners area.



To better spread the outcomes of the project and to disseminate the Joint Action Plan, a specific publication was designed and published. In this booklet (about 60 pages) the main achievements and the considerations around the most important topics of the JAP have been described to the public together with case studies (provided also by the Advisory group), insights and lessons learnt. A version in Italian was afterwards produced to adapt the context and the messages to companies in the Veneto Region.

Apart from the events specifically organised in the frame of the project, all the partners contributed to the dissemination activities

promoting KEEN-Regions and its results in **local meetings and international workshops**. Below a detailed list is provided.

4.1.5 The address of the project public website, if applicable as well as relevant contact details.



KEEN Regions

www.keen-regions.eu

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