KEEN REGIONS

Knowledge and Excellence in
European Nanotechnology Regions

Smart methodology applied to nanotechnologies

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Summary

Foreward

Innovation does not come about by chance.

Creating the best conditions for companies to increase their innovation capacities is the responsibility of politics, that has to choose and mix simple and flexible tools to face nowadays challenges: the international crisis, the knowledge economy, global competitiveness.

SMEs are at the core of production and they constitute the engine of innovation. They need to open up to and embrace research if they are willing to stay competitive. Veneto is being rapidly improving its performance as R&D as a percentage of GDP, with companies contributing with 64,5% of the total R&D spent in the region. To improve further, academia, business and local authorities need to act as they were in a system of communicating vessels. This is what KEEN Regions project is about: combining resources and increasing synergies between the triple helix actors to create a significant potential for research and economic development in EU regions.

Investing and boosting strategic sectors for the sake of our local economy is the way ahead, as per the smart specialisation concept pointed out by the European Union. Veneto has chosen nanotechnology as a priority sector, which has revealed the potential to act as a powerful catalyst for economic development, and it has been devoting considerable efforts and resources in this field. So have done our partners in the Basque Country and in Rhone Alpes. As a step forward, key players from the three regions have been exchanging experiences and methodologies with a view to learn and improve their policies and tools at local level, and to set the ground for future collaboration.

Translation of research results into marketable products, attention to the needs of the companies and valorisation of the human capital of researchers constituted the priority themes underlying useful action proposals, collected in a Joint Action Plan. Such actions outdo the edges of the partnership and set the legacy of KEEN Regions.

Maria Luisa Coppola
Councillor for economic development, research and innovation
Veneto Region

Greetings from KEEN Regions partners

Cristina Oyòn
SPRI

"The Basque Country has made a strong commitment to foster nanotechnology as catalyst of radical innovation by means of providing a new relationship model in which Basque companies, research centres, technology centres and universities collaborate much more closely in order to achieve the qualitative and quantitative leap that will allow them to compete on a global playing field with new, added-value products and processes. Although it is still too early to analyse its evolution, the scientific and corporate progress achieved in the Basque Country in the fields of nanoscience, micro and nanotechnology suggests that the region is moving in the right direction towards the stated objectives of nanoBasque Strategy, such as greater private R+D investment in these fields, an increased technological intensity of the Basque industrial framework and the generation of a greater competitive advantage in the Basque Innovation System".

Raffaele Zanon
President of Veneto Innovazione

"Our role as a regional innovation agency is to build bridges between research and business, to stimulate discussion among stakeholders involved and to work in synergy with our region to design a research strategy that looks to the future, starting from our specific context.
KEEN Regions has allowed us to see how it is possible to link what is being done in Veneto with what can be done together with other European partners."

Geneviève Fioraso
Ville de Grenoble

"Grenoble encourages and supports cooperation between research and industry. Technology transfer is a source of innovation, entrepreneurship and job creation. The European project KEEN Regions helped bringing together industry players, research and local governments of Veneto, Spanish Basque country and Rhône-Alpes. This project helped creating links between European regions in the field of micro-and nanotechnology laying the foundations for future cooperation in science, technology and economic priorities in a joint action plan".

Introduction

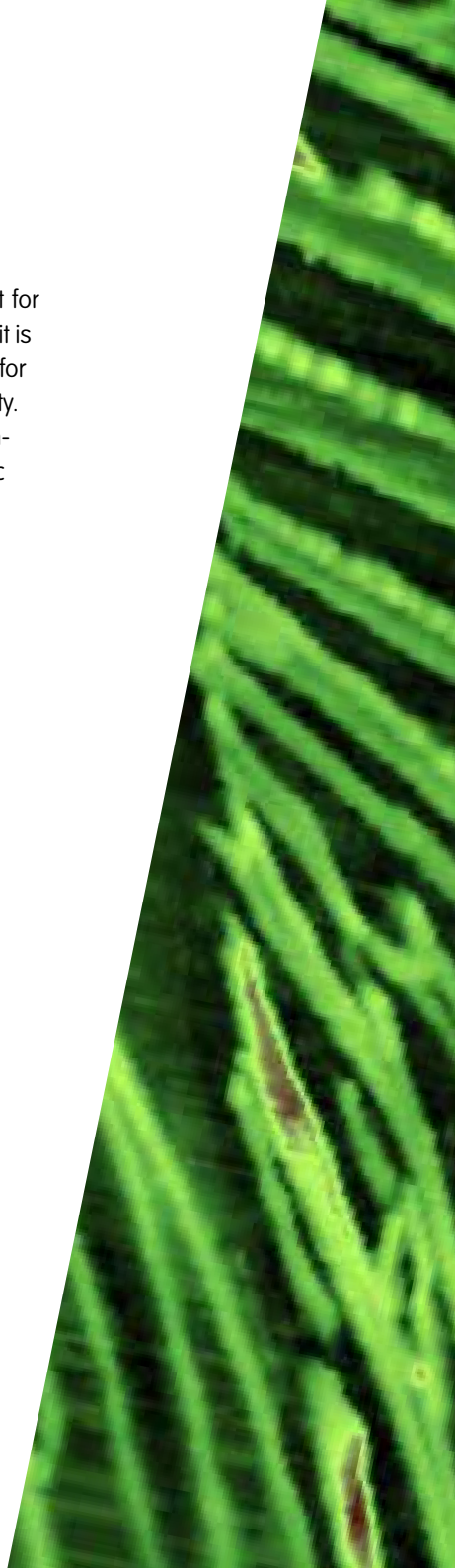
Nanotechnology is a very promising area as the potential applications are broad and the impact for the local economic development is high. Anyway, to gain a competitive position in this exciting field it is mandatory to have excellent research infrastructures, multidisciplinary competencies, investments 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. This is the case of the nanotechnology clusters in Veneto, Rhône-Alpes and the Basque Country, which have been working together since 2009 in KEEN Regions.

The project has aimed to accelerate and enhance the innovation process and the research development of the three nanotechnology clusters 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.

This booklet treasures KEEN Regions main results and it addresses all the regional/local stakeholders involved in the decision-making process. Its purpose is to:

- give an overview of the main KEEN Regions findings;
- describe the methodology used to identify proposals for action at local and at transregional level;
- share the main proposals for action adopted by the KEEN Regions partners;
- provide policy recommendations for policy-makers.

The added value of this booklet is that the methodology and the recommendations suggested by KEEN Regions can be horizontally applied to several research and innovation policies, beyond the specific sector of nanotechnologies.



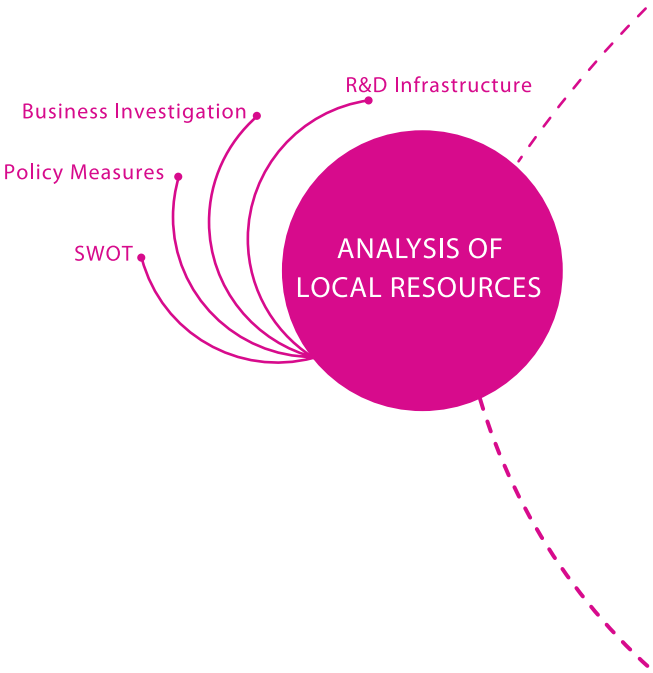
A new methodological approach

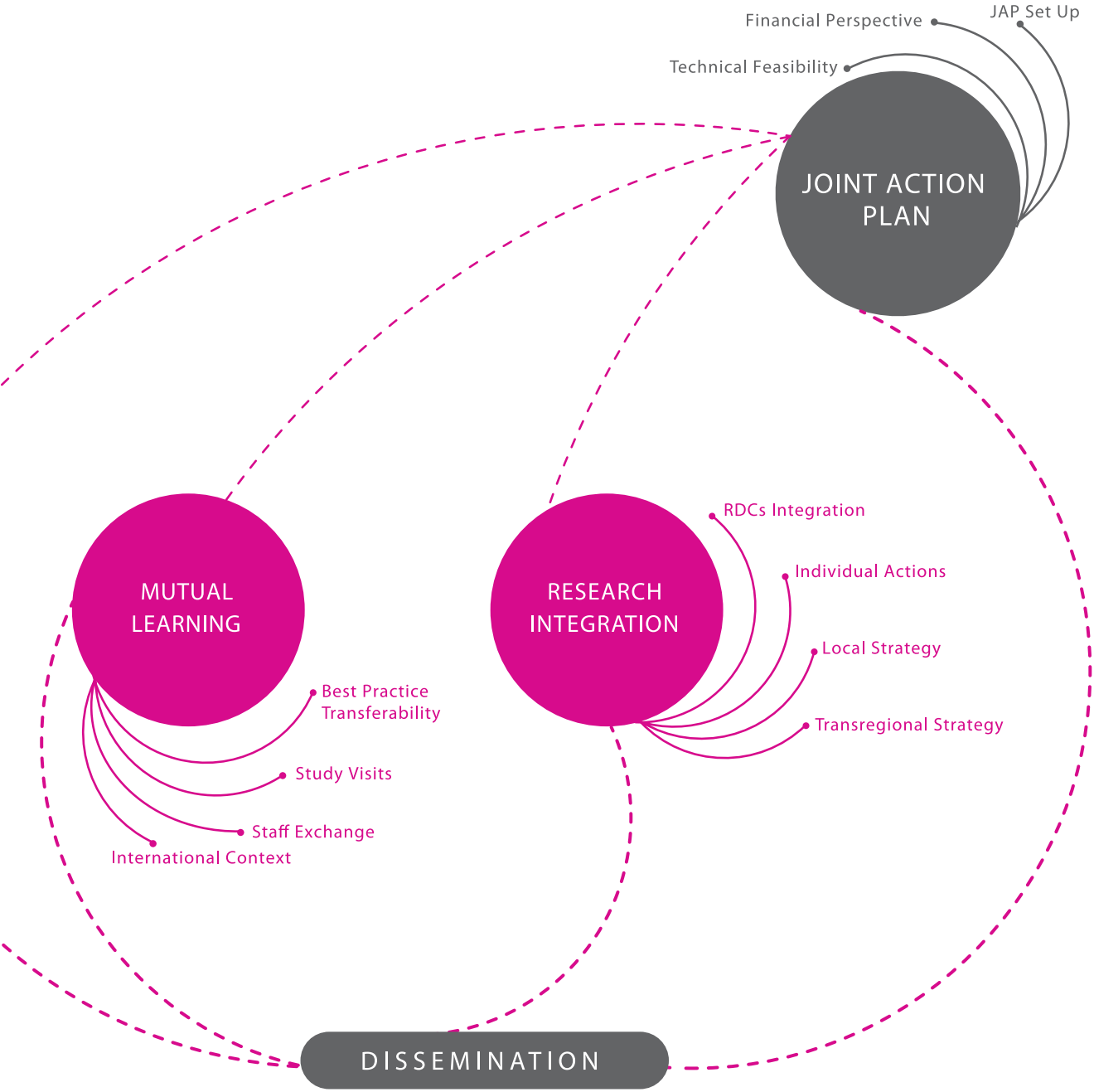
KEEN Regions has tested a **creative approach** for joint planning regional innovation strategies, aimed at delivering a strategic analysis at policy level on perceived needs and feasible solutions in the three partner regions. A bottom-up approach has marked the whole process leading to a Joint Action Plan shared among the actors involved and valorised at trans-regional level.

The three-steps methodology has consisted in:

- **Mapping and comparing** local resources and infrastructures to ease reciprocal knowledge between partners;
- **Deepening individual relations and contacts**, exchanging best practices and getting an overview of extra-KEEN experiences in order to identify potential areas of improvement at local level and collaboration at trans-regional level;
- **Approaching three horizontal themes** using a **working group method** to deliver proposals of action implementable locally and trans-regionally.

The Joint Action Plan, the main and final outcome of KEEN Regions, has been developed in close collaboration with all partners in the participating regions. It includes the priority actions set for each of them, and highlights the potential synergies and collaboration activities which have been identified.

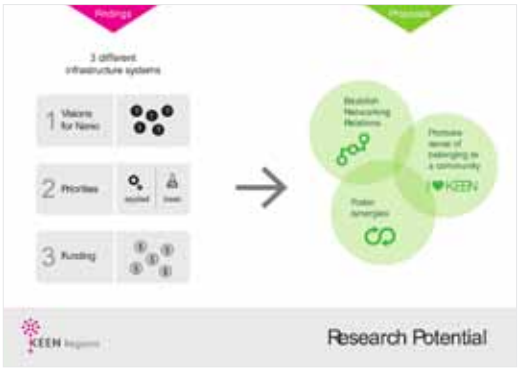



Financial Perspective
JAP Set Up
Technical Feasibility
JOINT ACTION PLAN
MUTUAL LEARNING
RESEARCH INTEGRATION
RDCs Integration
Individual Actions
Local Strategy
Transregional Strategy
Best Practice Transferability
Study Visits
Staff Exchange
International Context
DISSEMINATION

Setting the frame in the KEEN Regions

Veneto, Rhône-Alpes and the Basque Country embody three different models of nanotechnology research driven clusters. Research potential, relations with business and policy schemes are factors revealing the gaps and unveiling the opportunities for collaboration between them.

In KEEN Regions, the **mapping and analysis of existing resources** has aimed to collect and share selected information about each research driven cluster, in order for the partners to gain more and targeted information. **SWOT analysis** elaborated on a regional basis have led to the identification of the main challenges and gaps in the cooperation patterns and have contributed to develop ideas for new local and collaborative instruments, as well as for cooperation topics. Thirty institutes and laboratories in the three regions have been assessed to get an overview of the **research potential**. In detail, facilities, equipment, researchers/technicians, financial resources, research potentialities and international collaboration initiatives have been investigated.



Responding to different strategies and to local contexts, the three research driven clusters:

1 **focus on different sectors**

The Veneto cluster specializes in innovative materials and surface treatments (e.g. protective and functional coatings), as they have a direct impact on regional economic leading sectors such as plastics, mechanics and the sport system. The Grenoble area is recognized as a worldwide leader in microelectronics and embedded systems, having 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), nanomagnetism, nano-optics, self-assembly, nanobiotechnology, nanodevices.

2 **prioritize applied or basic research according to their own mission**

3 **dispose of unlike ranges of public/private funding, something which impacts on the different size of the clusters**

The main proposals to overcome these differences have consisted in setting up tools to establish networking relations, foster synergies and promote the sense of belonging to the KEEN community, as necessary means to

- maximize the use of the research infrastructures,
- encourage relations between researchers and
- ensure the sustainability of the results of the project beyond its end.

The **business investigation analysis** has explored the needs and potentialities of the business community, as well as the approach of companies toward nanotechnologies, collecting information from members of the clusters. Overall, a critical mass of SMEs already acting as nanoproducers or nanoconsumers is missing in the three partner regions. What is more, despite companies perceive the valuable economic potential of nanotechnologies, they only have a partial awareness of their potentialities. 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 is 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 to raise awareness on concrete potentialities of the nanotech sector emerge as key challenges.

Proposal for actions include 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.

Analysis of **policy actions and funding schemes for nanotechnologies** revealed that public support has been the decisive engine for the development of the sector in the three areas from 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-to-research and research-to-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,
- increase dramatically the collaboration with private institutions and companies.

Public administrations can push the opening out of a market for nanotechnologies through a new approach to public procurement. In fact, the purchase of goods and services 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 can boost market growth, leveraging the demand side.

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.

A **SWOT analysis**, based on previous mapping and investigations, has been carried out in each research driven cluster. 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 have been 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.

Communicating nanotechnologies

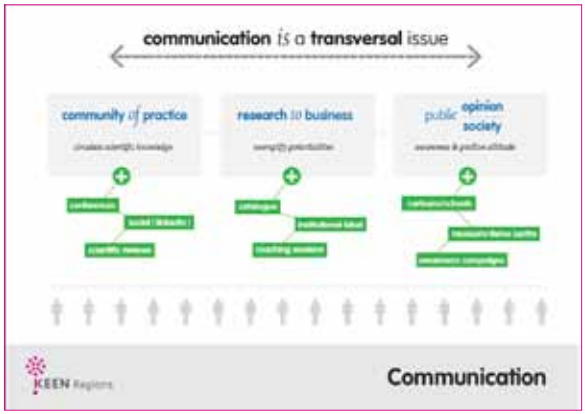
a critical topic for all

During the project life, one the main issues emerged from the mapping and analysis phase is the need to boost communication at a transversal level:

- **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 at 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 towads 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.

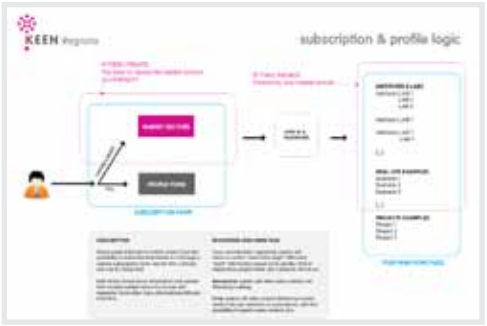
For instance social media and internet-based tools have been recognised as a powerful instrument to intensify the cooperation and share information among the available equipments. Demo centres, communication campaigns and cartoons (see for instance minalogic.komunsens.fr) have been proposed as useful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

As mentioned, another big issue emerged during the analysis has been how increasing the use of Nano-applications. An important step forward might be easily showing the link among common business

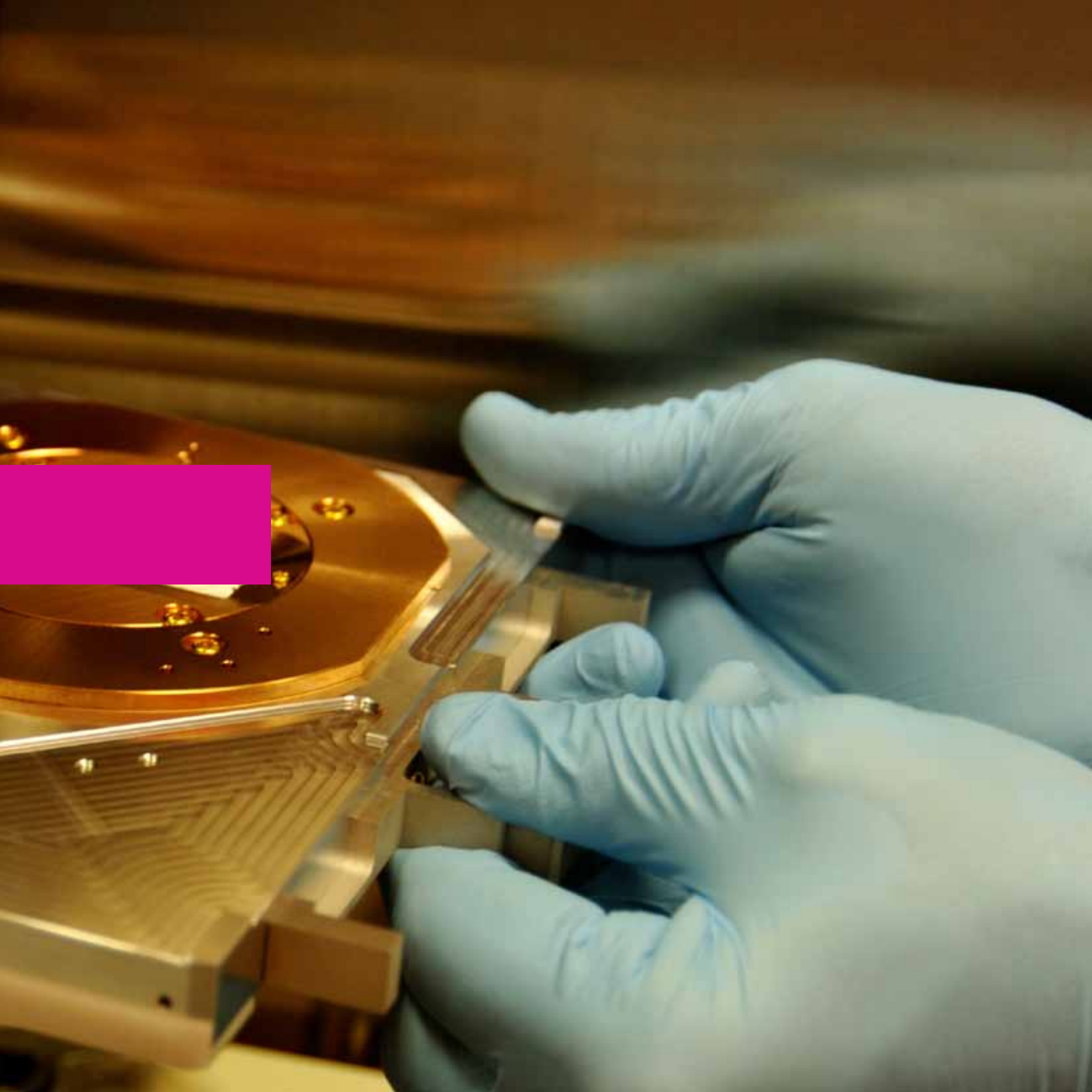
business needs and possible Nano-solutions. This is indeed the purpose of the KEEN Regions cooperation platform (keen-regions.eu) which was planned and designed to facilitate the gaps and solutions matching. An automatic search engine was built and tested in order to deliver customised information according to the user profile. Concrete examples of Nano-applications, written in a straightforward and plain language are provided to exemplify entrepreneurs the added value of the proposed solutions.

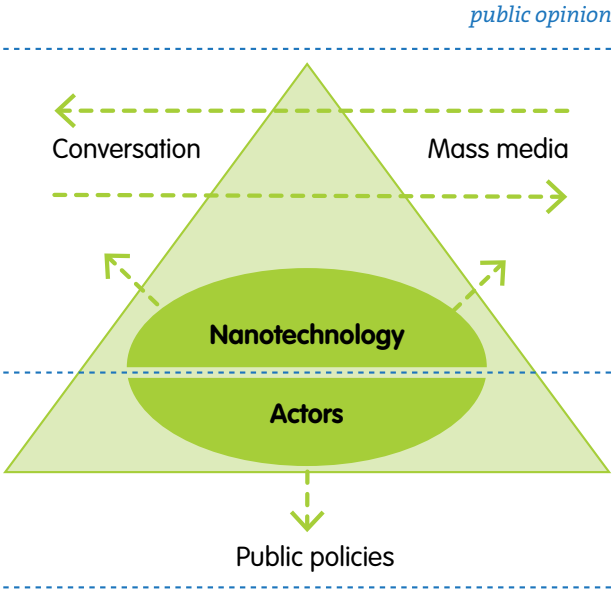
KEEN-borg: the interactive side of KEEN

The search engine is the heart of the collaboration platform. It 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 is moreover stimulating entrepreneurs to imagine other possible applications of nano-technologies.



Perceptions, narratives and debates about nanotechnologies





An analysis on the public perception of nanotechnology has been carried out with regard to the most dynamic countries in this field. The outcomes have contributed to define an horizontal approach to communication and dissemination issues, applicable to the actions included in the Joint Action Plan.

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 been considered (public perception, media narratives and patterns of public engagement mechanisms), setting the frame in which policy makers normally act.

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.

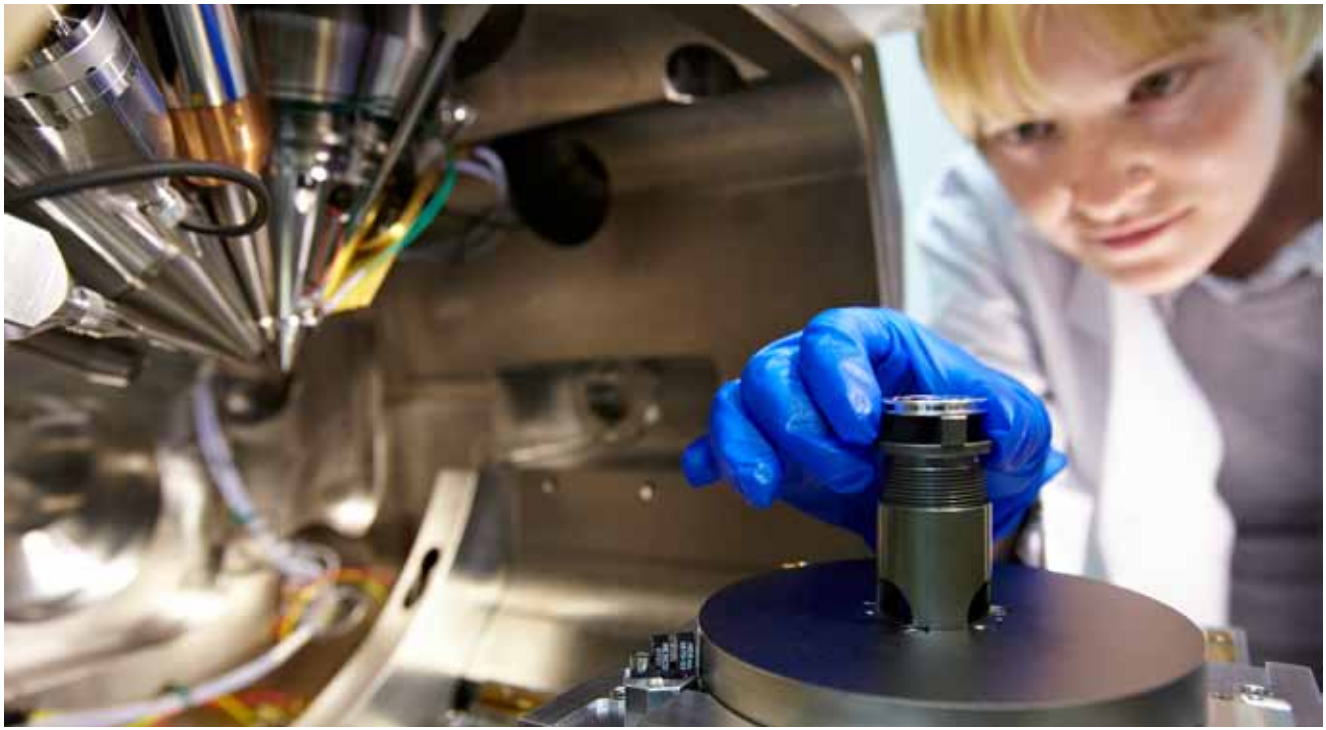
Thus, citizens are concerned about the socio-political framework of innovation (who is involved, who is responsible, what are the goals of these policies) equally, and probably more, than the assessment of toxicological or ecotoxicological risks.

Mass media coverage contributes disseminating a positive image of nanotechnology

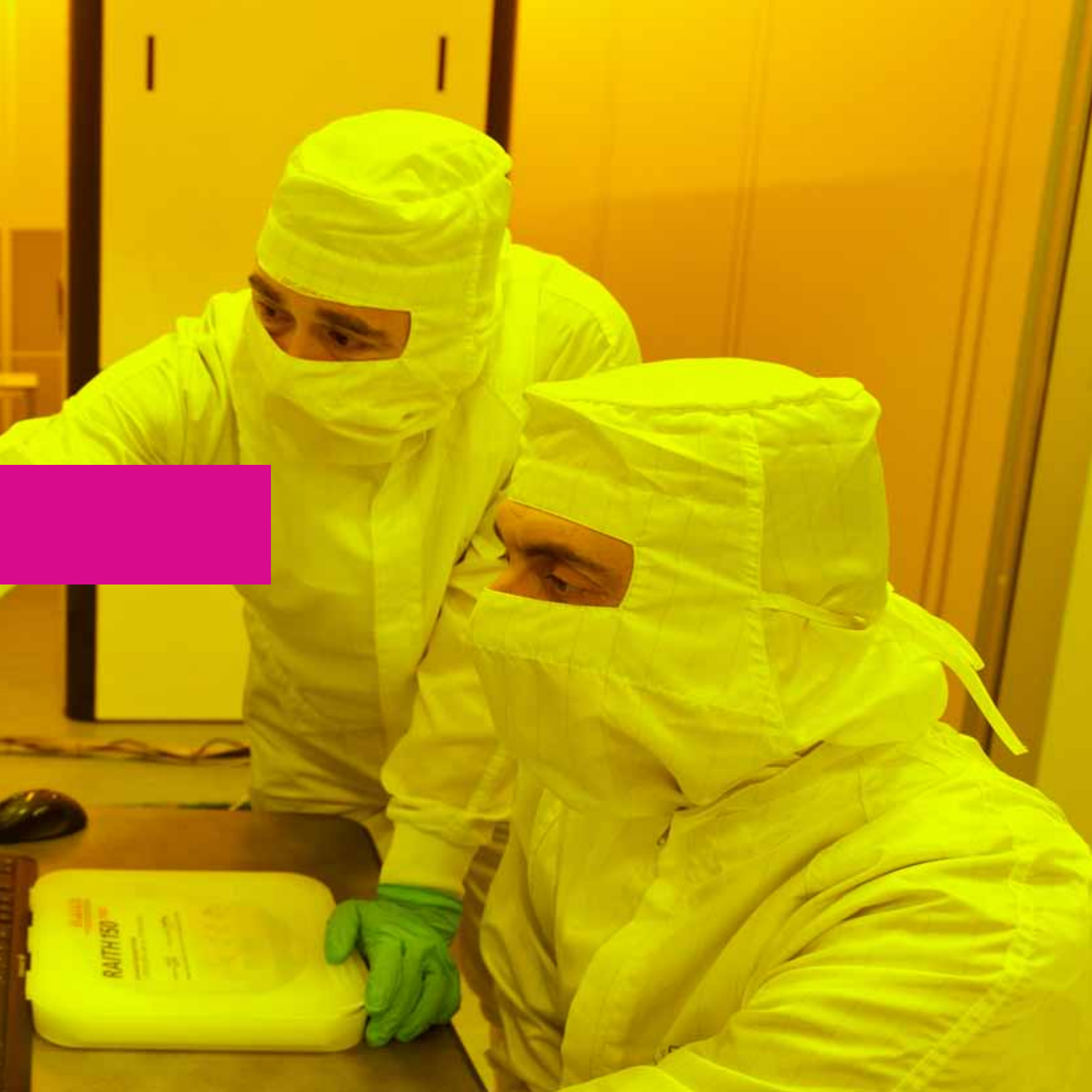
Though nanotechnology media coverage is actually suffering a declining trend in quantitative terms, it appears overwhelmingly positive. Existing research on media narratives of nanotechnology are seemingly diffusing an overall positive image of nanoscale technologies and science, by emphasizing the benefits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

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 "organized 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.



JAP. From needs to priority actions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KEEN Regions has 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 (JAP)**.

STEP 1

Mapping and analysis of existing resources

Having a clear picture of what is going on at local level in the nanotechnology sector has been a preliminary step for each partner to update on its own resources and to get information about others' experiences.

Mapping of the research potential has helped getting information on research infrastructures and knowledge resources.

How to...

Prepare a structured questionnaire for the relevant research centres in your region! The questionnaire has to be designed so as to gather quantitative data on

- *scientific personnel profile*
- *research potentiality*
- *equipment*
- *expertise*

and to determine the research focus of each centre.

Business investigation has explored the business context and the approach of companies towards nanotechnology, revealing their perceived problems and needs.

How to...

According to the local contexts and specificities, different tools can be used. Of course, direct communication with the selected companies is the safest way to get the right information!

- *questionnaires*
- *polls*
- *direct interviews*
- *secondary sources*
- *recent surveys on the same field*
- *workshops*

Policy measures analysis has allowed to get acknowledged of other partner regions' policies, financial schemes, regional development plans and research agendas for the development of nanotechnologies.

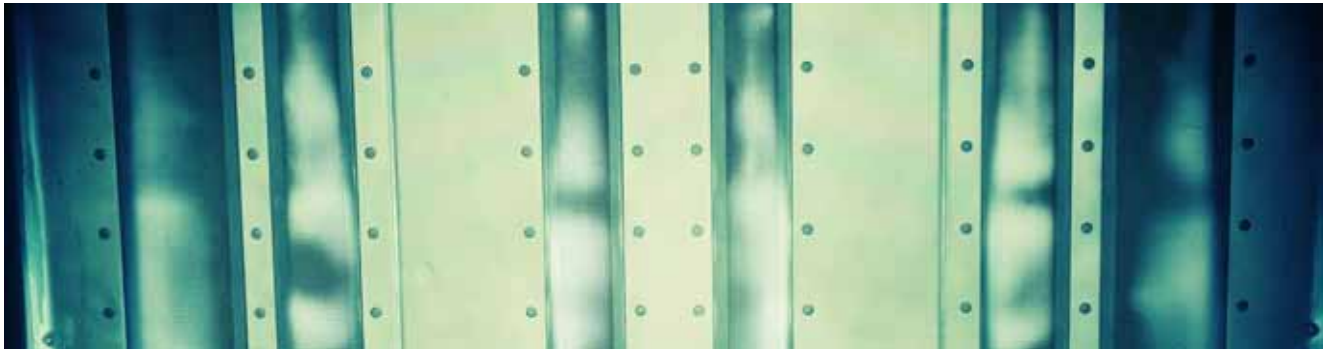
How to...

Secondary sources and internet can be helpful to make yourself a general picture of what is going on at local level concerning public funding for nanotechnologies. Nonetheless, a simple questionnaire aimed to collect qualitative and quantitative data on type of funding and amount of resources available, and to analyze the involvement of different stakeholders in the nanotechnology sector, is the most appropriate tool. A specific focus on the goals of the funding schemes and the type of activity funded are essential components of the questionnaire. It has to be submitted directly to the local public authorities and it allows to collect complete and updated information.

SWOT analysis performed by each research driven cluster on the basis of data collected in the three previous reports have allowed further comparison between the different areas and to point out possible complementarities.

How to...

The SWOT analysis is an easy and intuitive tool which provides the basic elements for developing a policy strategy. Applied to a wide sector like the nanotechnology one, it has to be performed by stakeholders heavily involved in it, as they are the best connoisseurs of strengths and weaknesses. The actors of the triple helix, major and compulsory element in the RoK programme, represent the best possible contributors. The inputs for the SWOT cannot be or originate from preconceived beliefs, but they have to be based on facts, as those collected in the mapping/ analysis phase.



STEP 2

Mutual learning

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. Activities relevant to the mutual learning have been carried out in parallel with those in step 1.

3 in-site visits have been conducted in laboratories and research institutes located in the partner regions. Key players and local stakeholders have 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 and the building of interpersonal relations.

How to...

When organizing visits at laboratories and research institutes with guests with different backgrounds, make sure the speakers know the composition of the audience, so they can address them accordingly! If the schedule allows it, split the guests in different groups, so they will get the information they are interested in the most.

26 transferable best practices on nanotechnology initiatives, programmes and funding schemes have been identified by the partners. A transferability plan, providing the necessary information to assess if the best practice is transferable and how to import it, has been aimed to give suggestions to the partners concerning possible new actions. Also, the exchange of the best practices has resulted very useful for selecting the common topics of interest for future developments at local and at transregional level. In particular, 3 macro-topics have been identified:

- 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 has been identified as a "yardstick" to get inspiration from in the next integration phase.

Fostering and improving the cooperation among research and business

Personalized Coaching for SMEs *is an activity carried out by CRACA in Veneto to bring companies closer to the nanotechnology field.*

Companies manifesting their interest in nanotechnologies are contacted and invited in a two-step activity:

- *a coaching session with an expert, organized during extra-working time, to give basic information on nanotechnologies*
- *a visit to a laboratory, to give a concrete overview of the processes and the commercial products realized through nanotechnologies.*

Stimulating the generation process of innovative ideas

The **MINATEC IDEAs Laboratory**, *located in Grenoble, is a public/ private initiative, established to develop useful applications for new technologies. The IDEAs Lab brings together the advanced technology skills available at CEA and MINATEC, and combine them with a more people-oriented approach that takes into account both new applications and the concerns of society at large. Technology experts, engineers, and users work together in a 3-pronged, design-oriented approach that builds upon the R&D work carried out at CEA-MINATEC.*

More info at http://www.ideas-laboratory.com

Supporting the development of an instrument for the international mobility of researchers

Ikerbasque (box topic 3), *the Basque Science Foundation, works to reinforce the local system of science by attracting top researchers with international experience.*

Ikerbasque aims to

- *reinforce the Basque system of science attracting scientists from other countries*
- *develop a Basque system of science through the creation of Basque Excellence Research Centers*
- *promote the Basque Country as a benchmark in research.*

More info at http://www.ikerbasque.net

Short exchange programmes for research personnel are apt to foster long-term collaborations between partners. Live experiences are highly valuable as they let the staff get acquainted with a different work environment and meet colleagues involved in the same research areas.

Experiencing research in different contexts is an enriching and priceless experience!

STEP 3

Research driven integration

The research driven integration phase has 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** has been adopted, so that the in-depth analysis of the three macro-topics has been carried out by three groups, which have discussed and identified feasible initiatives at local and trans-regional level. Overall, 22 individual actions (15 at local level, 7 at trans-regional level) have been suggested by the working groups.

3 regional meetings have been organized to select those actions that partners considered most beneficial for their local area and for trans-regional cooperation, and to suggest new ones.

An **international context analysis** on public perception, the media and public engagement in technology decision, has provided useful elements for the partners to reflect upon the role of communication and awareness raising in the nanotechnology field.

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

The Advisory Group

The AG is a supporting body which collaborates 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 has been 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 have been identified accordingly to their vast experience in managing funds and programmes for RTD activities in their countries and they bring to the discussion different approaches. Members of the AG are VDI-VDE IT (DE); Culminatum (FI); IWT (BE); Gedeon Richter (HU).

The **Joint Action Plan** 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.

Needs and solutions 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.

JAP

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.

JAP **Actions included in the JAP**

- ✓ Nanotech Demo Centre
- ✓ e-NanoMarketplace
- ✓ Innovation cycle

Valorization of the human capital

The innovation' x-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.

JAP **Actions included in the JAP**

- ✓ Programme «Business gains Brains»

Cooperation opportunities 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

- ✓ joint 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

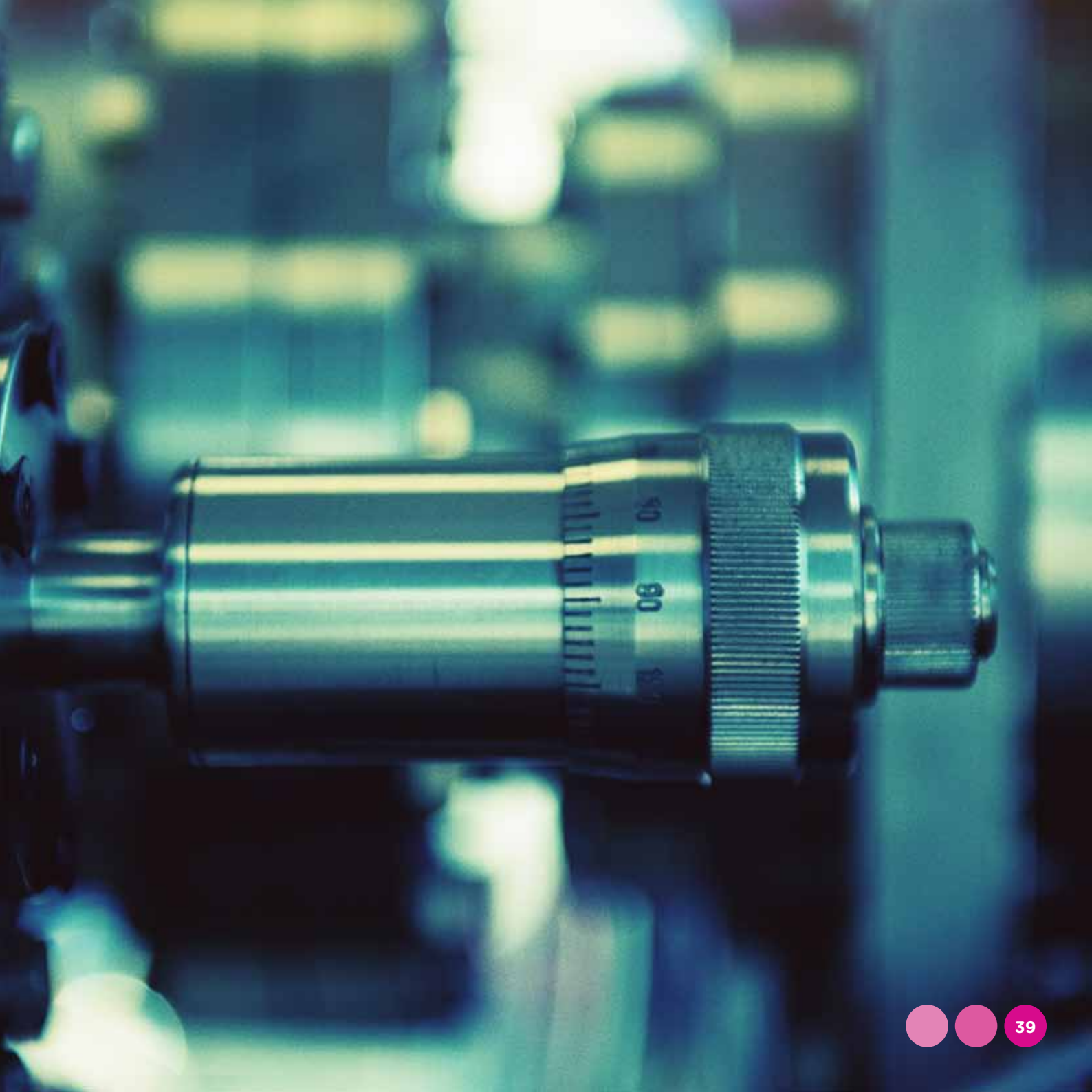
- ✓ jointly applying to Marie Curie Actions;
- ✓ sharing information on vacancies for research staff in partner research centres.

JAP **Actions included in the JAP**

JAP

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 "cloud cluster for nanotechnologies"
- ✓ Collaborative projects to develop Key Enabling Technologies
- ✓ Idea's day in…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

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, strategic centres of excellence in Finland. Funding instruments to engage companies into research

SHOKs, the strategic centres of excellence, is a new funding instrument in Finland for engaging companies into research. Public funding is provided by Tekes, the national funding organisation for applied research in Universities and industrial R&D. There are currently 5 SHOKs (forestry, machinery, cleantech, pharma&diagnostics and building). The SHOKs 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. There are programs within the SHOKs where only part of the owners participate, and the IPR is shared by the project participants. 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. This is how the universities are engaged in long term competitiveness of Finnish industries.

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

For info check: www.cleen.fi, www.fimecc.fi, www.salwe.fi

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. Flanders

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

Commercializing nanotechnology implies 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.olaeplus.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 partnership to enhance cross regional programs can be improved through dedicated nonprofit 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 nonprofit 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 'cross border'. 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 their own initiatives is an asset.

For info check: www.dspvalley.com

Start-ups should be raised into the whole research community's awareness; a professional communication strategy (articles, prizes, etc.) to bring them into public awareness is recommendable. For positive prospects, commercialization prize could be one approach.

THE CASE:

THE CASE: Optoelectronics Research Centre (ORC) – 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 SME's. 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-incidence 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 "spoken in". 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.

Lessons learned: Living labs, in commercializing nanotechnology, provide unique opportunities to get feedback from the users. A well-organized living lab could serve as a piloting environment, allowing proof of concept data for marketing and convincing the investor candidates. In addition, at its best it would also make a show room and door opener to new business sectors.

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 – 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 most 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:

THE CASE: NanoSchoolBox – 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 a 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 – Germany. Meeting place nanoworld

The mobile information campaign on nanotechnology "nanoTruck – 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 how to access and the implementation, including practical usage of the difficult and expensive tools, contracts, billing etc.

For info check: www.vttmemsfab.fi

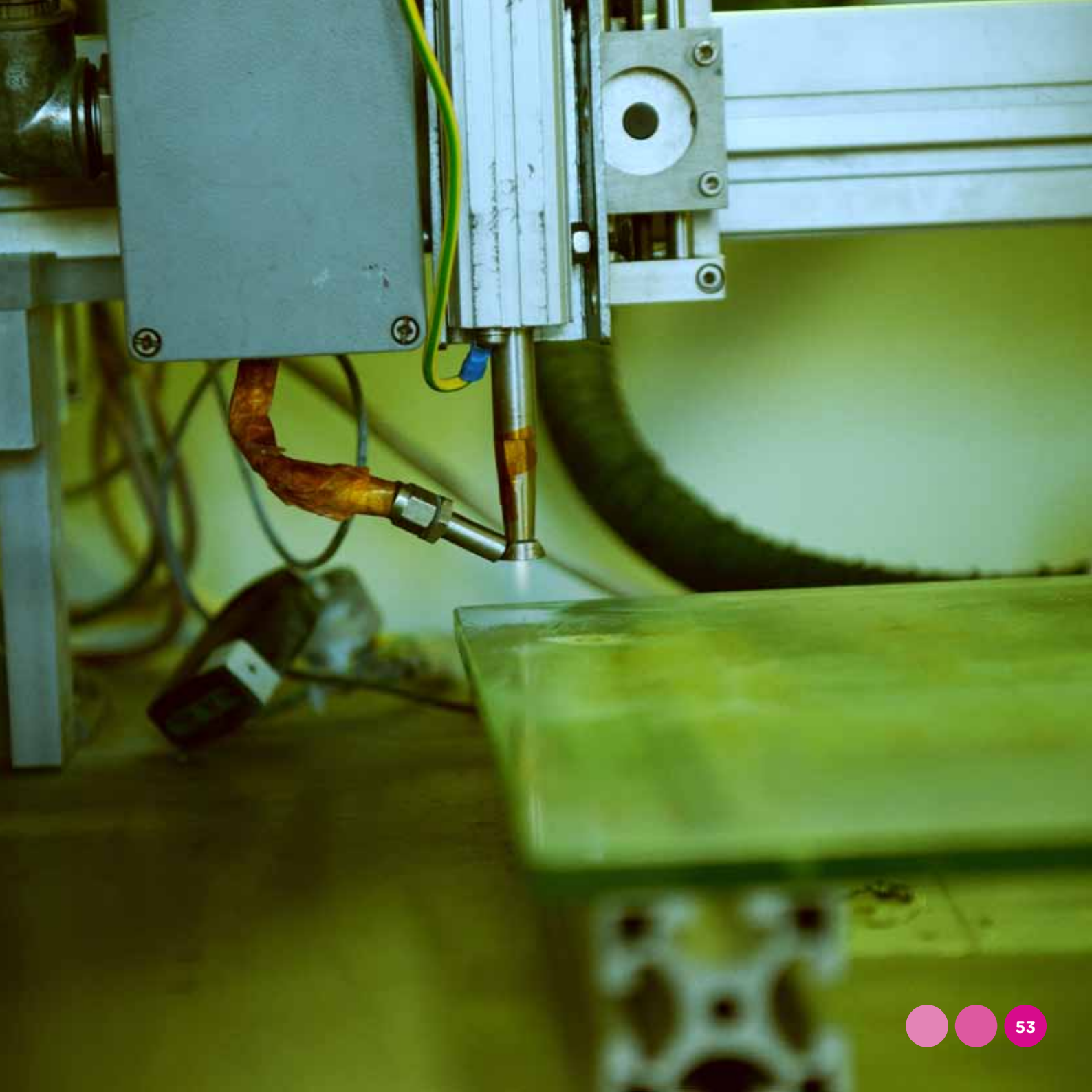
It is possible to encourage the use of research infrastructures by the companies foreseeing such costs as eligible expenses in R&D&I projects.

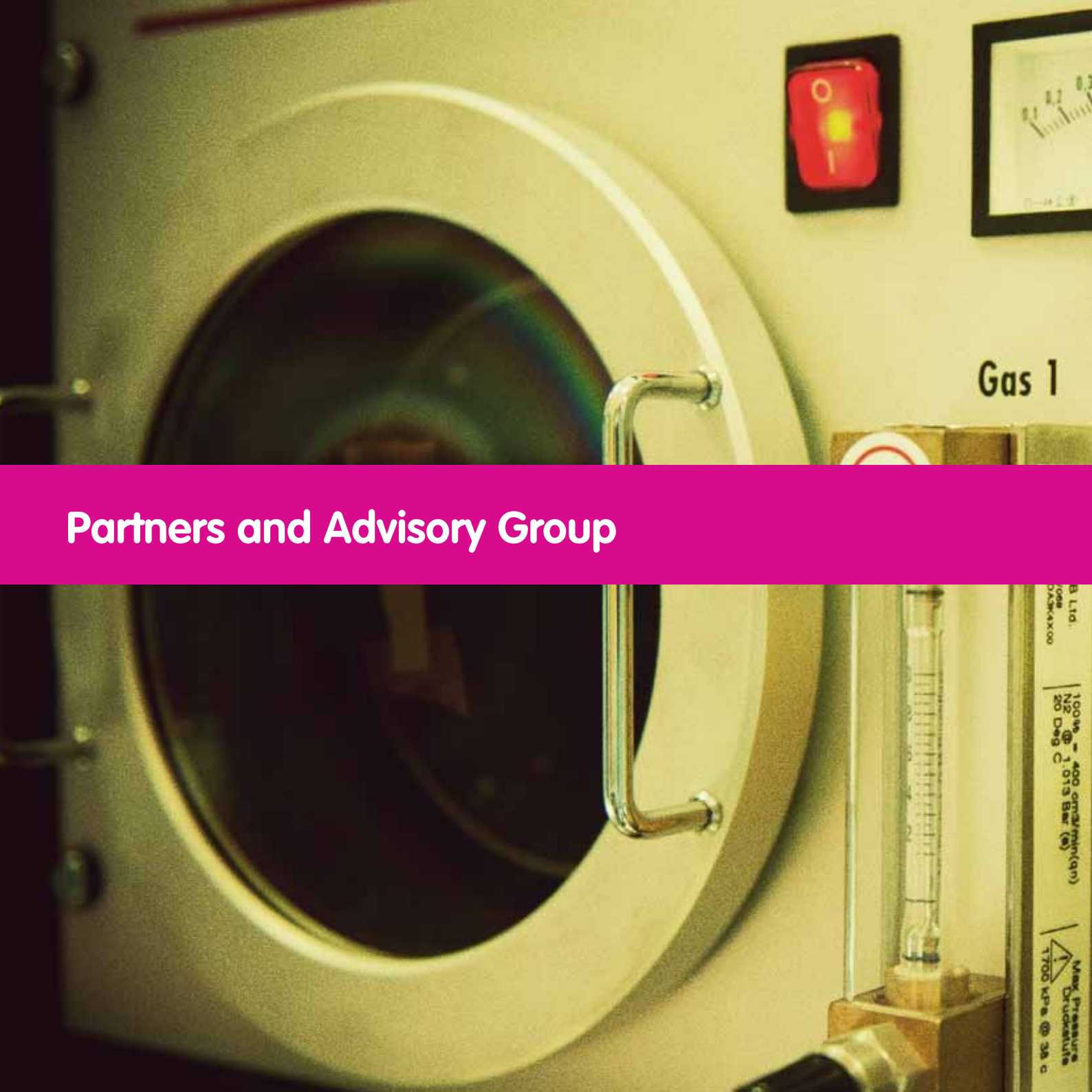
To support creation of start-ups based on access to research infrastructure requires an entrepreneurship encouraging atmosphere within the research group. In addition, successful implementation requires a clear model on how to do it; for example the start-up could use the equipment after office hours 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 – 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. Initiatives like Enterprise European Network are a valuable instrument.





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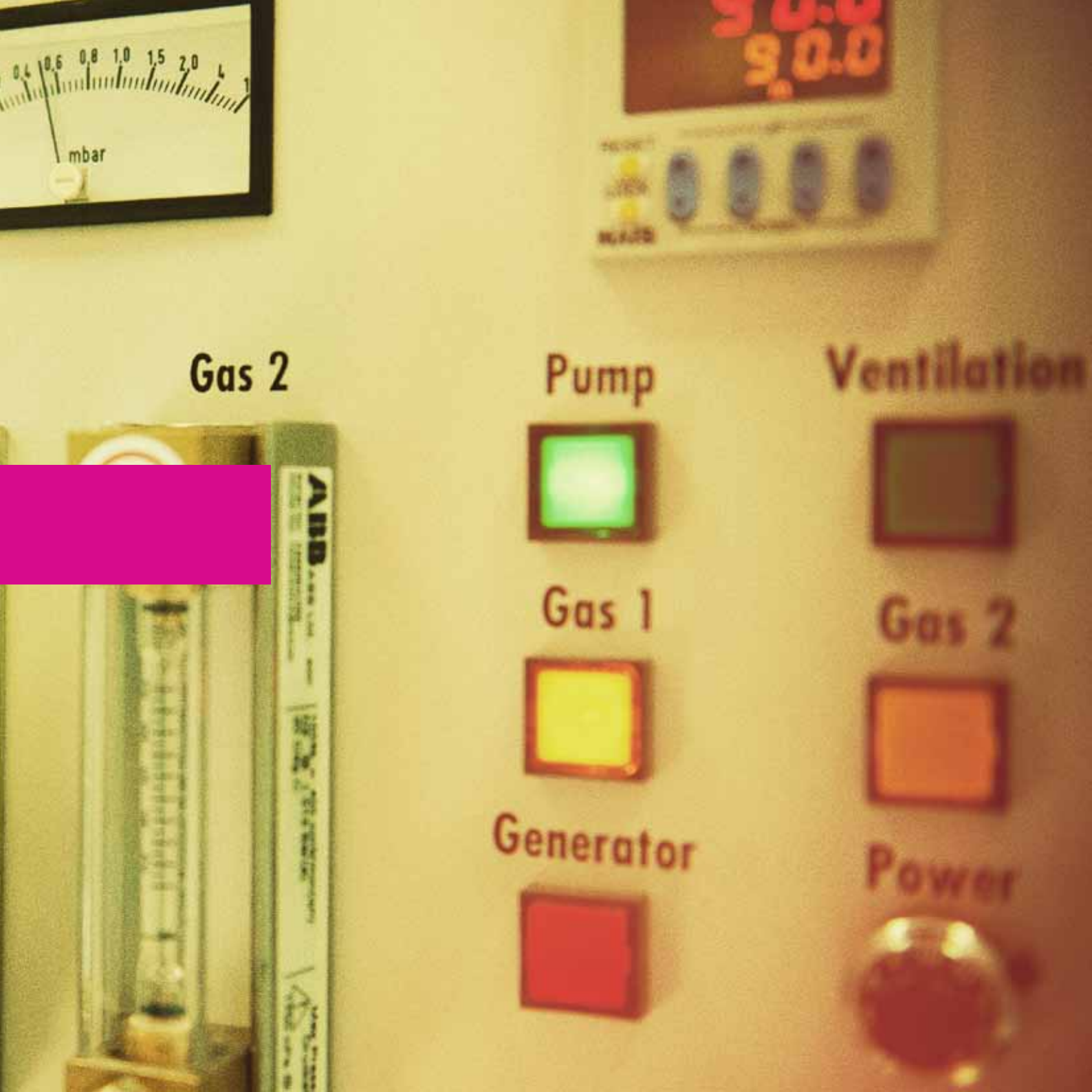
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Gas 1
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Regione del Veneto

www.regione.veneto.it

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