

SEVENTH FRAMEWORK PROGRAMME



FP7-NMP-2013-CSA-7 GRANT AGREEMENT NO: 608684



Value4Nano: Industrial valorisation of strategic value chains for nano-enabled products

D4.2. Local/national contact points network description.**Identifier:**

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Due date of deliverable	31/10/2014
Contribution	NANO <i>ofutures</i> Lighthouses's network (including project partners NfA and D'Appolonia)
Distribution ¹	PU
Status	Final

¹ PU: Public, RE: restricted to a group specified by the consortium CO: Confidential, only for members of the consortium; Commission services always included.

¹ Draft, Revised, Final

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1 Introduction

The present document constitutes Deliverable D4.2 in the framework of the project “Value4Nano: Industrial valorization of strategic value chains for nano-enabled products (Project Acronym: Value4Nano; Contract No.: 608684 FP7-NMP-2013-CSA-7).

In 2012 NANO*utures* platform initiated the creation of a local/regional connections network, named “NANO*utures* lighthouses”. The idea was to coordinate efforts, being aware of the nano initiatives, key projects, activities and policies at local level, and to strength potential of the regions. Moreover, the Lighthouses help to translate the strategies and actions at European level to the regions and disseminate the NANO*utures* platform activities.

One of the objectives of NANO*utures* Platform in the framework of Value4Nano project is to keep increasing and reinforcing this network so that it becomes more representative and open new paths for contributions and collaborations worldwide. At the beginning of the project, it had 12 members and currently it involves 24 countries of Europe, Asia and Latin America (Figure 1). This is a result of the activities performed within the framework of Work Package 4 (WP4): “Exploitation, Networking and Dissemination”, and more specifically of Task 4.3 “International, European and regional networking”, led by PRODINTEC and with the collaboration of D’Appolonia.

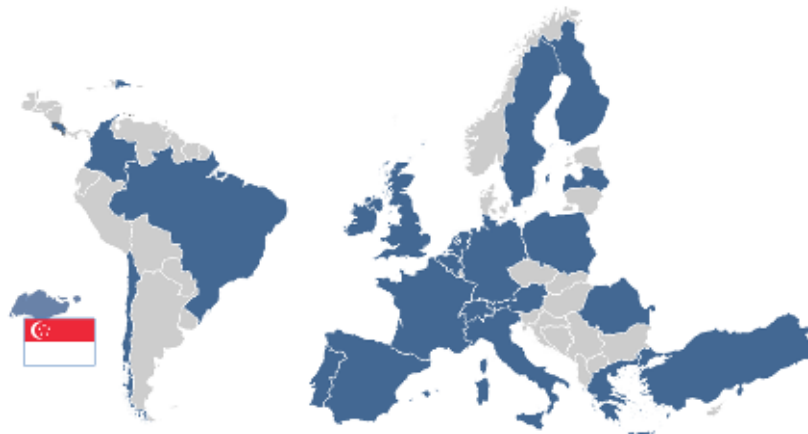


Figure 1: Map with NANO*utures* lighthouses (blue)

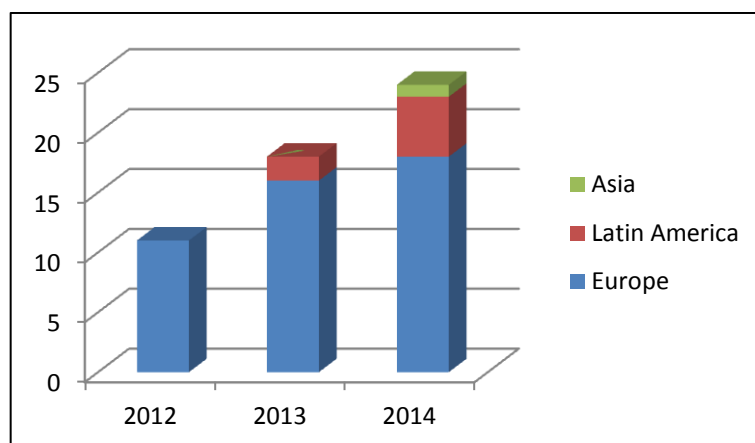


Figure 2: Evolution of the network from 2012 to 2014

The aim of this report is to describe the most relevant actions and initiatives going on in countries and regions regarding nano, and to produce a “NANO*utures* lighthouses directory” (which will be updated with each new addition to the network), in order to promote networking actions between members.

2 NANO*utures* lighthouses

2.1 Lighthouses’ functions

Among the **actions expected from the lighthouse**, the following are included:

- Inform NANO*utures* platform on the situation of nanotechnology in the country/region:
 - Key projects and initiatives
 - Local expertise related to nano
 - Existing infrastructure and latest developments
 - Events
 - Local /national legislation, etc.
- Dissemination of the NANO*utures* platform concept/actions/events using local tools and networks and in local/national related events that they may organized/participate in.
- Participating when possible in platform activities: i.e. when examples of successful cases in nanotechnology trying to find some, filling up possible questionnaires, suggesting possible speakers for events...
- Explain what NANO*utures* is to possible interested stakeholders to try to gather more members for networking activities, especially for collaborative proposals preparation.

On the other hand, through the platform, the lighthouses have the opportunity to:

- Promote their activities and events using platform tools: website, newsletters...
- Look for partners for further collaborations
- Increase the successful involvement of their local entities in R&D&I projects.
- Contribute to platform activities and attend platform meetings
- Be aware of latest developments of R&D&I policies, projects and initiatives on nanotechnology
- Learn from best practices in both technological and non-technological aspects

2.2 Directory of NANO*utures* lighthouses

2.2.1 Austria

AUSTRIA

Local/national contact point

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Contact point profile

BioNanoNet is an Austrian Network that combines a wide range of expertise in numerous medical and pharmaceutical disciplines, with a strong focus on nanomedicine and nanotoxicology. The BioNanoNet GmbH has the clear aim of supporting innovative interdisciplinary research by forming cooperative networks and synergistic collaborations in order to initiate and coordinate national and international research projects in the areas of medical and pharmaceutical research, specifically nanomedicine and nanotoxicology.

It is an Austrian network in the Key Enabling Technologies (KETs) of **bio- and nanotechnology** with international visibility in the **scientific areas** of:

1. [nanotoxicology](#),
2. [sensor technology](#)
3. [health and safety, including \(nano-\)medicine and nanosafety](#).

BioNanoNet has the clear aim to efficiently and selectively establish contacts among its members and potential customers, including those from the industry, in each of the network's thematic fields. Due to the multidisciplinary expertise of the individual members (national and international organisations, research organisations and universities), they offer their customers efficient solutions. The initiation and coordination of national and international research projects along the entire value chain is another important mission. BioNanoNet brings together researchers conducting medical and pharmaceutical research to increase the international competitiveness and visibility of all stakeholders.

The diversity and interdisciplinary nature of its members and their complementary areas of expertise allow them to find answers to great challenges and pressing issues across a wide range of applications and products, thus addressing medical needs by achieving important technical developments, e.g., in nanotechnology. Their substantial knowledge and experience ensures that further development in the key areas of the company takes place.

R&D policies, programs and other initiatives supporting nano

Austria presented the 'Austrian Nanotechnology Action Plan' by the Ministry of Life in 2009. In adopting this Plan on 2010, the Federal Government provided a clear mandate for its implementation by the end of 2012. Report with the conclusions can be found [here](#).

Moreover, in the Strategy for Research, Technology and Innovation (FTI Strategy) that Austria adopted on 2011, the country professes its commitment to nanotechnology.

The most relevant initiatives supporting nano in Austria are the following:

- Nanotechnology is especially funded in dedicated programs like "production of the future", "nano-EHS-program" as well as "joint calls" e.g. bilateral call with China, etc. The Austrian research focus Nano Environment, Health and Safety (NANO EHS) is the instrument for targeted funding of environmental and health-related research to assess the risks of manufactured nanomaterials.
- A key aspect of the Nanotechnology Action Plan is to strengthen communication and the dissemination of information to specific target groups, particularly the interested public. By developing an information portal for nanotechnology (www.nanoinformation.at), the public's desire for impartial and understandable information on the fundamentals, opportunities and risks of nanotechnology has been addressed.
- Austrian universities offer specific nano-programmes focusing on nanomedicine; nano(bio) technologies and many more.

Relevant projects

Austria participates in the following ERA-NETs related to nano:

- [SINN ERA-NET](#): promotes the safe and rapid transfer of European research results in nanoscience and nanotechnology (N&N) into industrial applications

Relevant & high impact projects related with nanotechnology in Austria are listed below:

- [nanoHealth project \(finished\)](#): aimed to develop new generations of nanoparticles for diagnosis, imaging and drug delivery. The use of NPs for early diagnosis, imaging and 'smart' drug delivery systems ("Nanocargo") ensures better and personalized health care.
- **NanoProdEx: Nanoproducts – Identification and Exposure**: a basic research project in the Research Program NANO Environment, Health and Safety. NanoProdEx provided a sound list of products, made and/or marketed in Austria; detailed investigation of nano-products prioritized by their relevance for consumers and a workshop for exploitation and dissemination of results, involving stakeholders and industry. A final report about project outcomes, including estimated future developments in nano-exposition, was published [here](#).
- Several other projects in the framework of the Austrian NanoInitiative have been running during the past 8 years. An overview about these projects is given on the website of the [Austrian Research-Funding Agency](#). The technological areas of these projects show the highly interdisciplinary expertise in Austria, from nano-health via nano-imprint-lithography towards photonics and semiconductors-technologies.

Some examples of key collaborative projects at EU level are listed below:

- [NanoDiode \(FP7\)](#): a project focusing on educational activities specialising in the knowledge transfer of relevant nanotech information on several educational levels.

BioNanoNet is one of the project partners.

- [NANoREG \(FP7\)](#): the AIT-Austrian Institute of Technology and BioNanoNet Forschungsgesellschaft mbH are the Austrian project partners. A key focus in this project is given on the initiating of value chain projects, integrating Austrian companies.
- [NanoEIS \(FP7\)](#): it investigates the European labour market for personnel trained in nanotechnology. It is coordinated by the Paris Lodron University of Salzburg.

Main RTD players and infrastructures in the country/region

Main nano-research in Austria is conducted within the following organizations:

- [Graz University of Technology](#). Graz University of Technology pursues top teaching and research in the fields of the engineering sciences and the technical-natural sciences.
- [Paris-Lodron-Universität Salzburg](#): the Department of Molecular Biology, work on the following areas: i) Signal transduction and gene expression in the immune system and ii) nanoparticles and human health. They also participate in other nano projects such as NanoTOES, NanoValid and MARINA.
- [JOANNEUM RESEARCH Forschungsgesellschaft MBH](#). Leading international research institute that develops solutions and technologies for commerce and industry covering a wide range of sectors. It plays a key role in facilitating the transfer of technology and knowledge in Styria.
- [Medical University of Graz](#). Their core competencies are high-standard training and education, research at an international level and continuous improvement of top-quality-medicine. Additionally, the orientation toward the bio-psycho-social model is one of the main concerns of the university.
- [University of Graz](#). One of Austria's largest and distinguished academic institutions. With its six faculties, the University of Graz boasts a wide range of educational opportunities. As a modern place of research in diverse disciplines, the University of Graz combines top-quality research in numerous projects and cooperation programmes on a national and international level.
- [AIT Austrian Institute of Technology GmbH](#). Austria's largest non-university institute for applied research. AIT provides research and technological development to realize basic innovations for the next generation of infrastructure related technologies in the fields of health & environment, energy, mobility and safety & security. These technological research areas are supplemented by the competence in foresight & policy development. One of their main research areas is "sensing life" including the development of bio- and nanosensor systems, such as biochips for medical diagnostics.
- [NanoTecCenter Weiz Forschungsgesellschaft mbh](#). Non-profit research company that conducts R&D works in the area of nanoscience and nanotechnology. Its focus is the development and application of nanostructured materials as well as the development of processes and devices in the fields of optoelectronics, sensors and nanoanalytics. Die NTC Weiz possesses an ISO 14644 accredited clean room, equipment to accomplish inkjet technology development at industrial stage as well as equipment for the fabrication of all current sensors and organic semiconductor devices.
- [piCHEM Forschungs- und Entwicklungs GmbH](#). Company specialized in producing high-performance chemicals based on peptides and proteins, used in medical, biochemical and pharmaceutical R&D. The company has more than 17 year's expertise

in the field of peptide chemistry.

- [Research Center Pharmaceutical Engineering GmbH](#). Interdisciplinary K1-research institute in the area of pharmaceutical process- and product-development. The RCPE focuses on the development and production of pharmaceuticals. Also, their research capabilities and technological background are available for companies on a service basis. Their service-portfolio covers research-, development- and transfer-projects with national and international partners from business and science.
- [Ludwig Boltzmann Institute of Experimental and Clinical Traumatology](#). In 2003, a satellite laboratory was established in Linz, Upper Austria, devoted to human adult stem cell research; the laboratory operates in conjunction with the Red Cross Bloodbank of Upper Austria. The primary objective of the Center for Traumatology Research is to improve diagnostic and therapeutic measures in trauma care specifically in the area of intensive care and tissue regeneration. Furthermore, it is involved in numerous Austrian and European research projects.
- **Messerli Research Institute of the University of Veterinary Medicine Vienna, the Medical University Vienna and the University Vienna**. This research unit is active at two universities: [Laboratory of Comparative Medicine](#), located at the University of Veterinary Medicine Vienna, and [Laboratory of Comparative Immunology and Oncology](#), located at the Medical University Vienna. More than 40 scientists work today in the laboratories. The development of novel vaccines against allergies and cancer is in the focus of research, with special emphasis on nanotechnology. Laboratory 1 is best equipped not only with standard device, but also high-end devices such as the automated laser scanning microscope Tissue FAXs, a Becton Dickinson FACS Canto II equipped with the latest software and two lasers, and an ISAC ImmunoCAP microchip scanner for molecular allergy diagnosis. Methods comprise biochemical and immunological Assays, immunohistochemistry, protein and antibody expression and purification, as well as all state of the art in vitro methods in allergy and cancer research.
- [Montanuniversität Leoben, Department Polymer Engineering and Science](#). Internationally recognized research institution working in the field of polymer engineering and science. The five key aspects of activity are injection molding, extrusion and compounding, polymer nanocomposites and nanotechnology, rheological and thermodynamic material properties and simulation.
- [Montanuniversität Leoben, Industrial Liaison Department](#). The focus of its activities lies on finding solutions for industrial problems and research challenges related to the expertise and research areas of the Montanuniversitaet. Networking and establishing cooperation between company partners, research institutions and the departments of this area are their main tasks.
- [University of Applied Sciences, Institute of Biomedical Science](#). The in-house infrastructure comprises three laboratories with equipment for clinical chemistry and immunology, histology, microbiology and molecular biology, an automated laboratory with analyzers linked to clinical laboratory information systems as well as laboratories with high-end equipment for chromatography and spectrometry. Additionally, the institute hosts two research laboratories: the Laboratory of Metabolomics, which delivers high-performance (bio)analytical services for cooperation partners from the research domain as well as for stakeholders from the industry, and the BIOMIC (biofilm formation on medical implants and catheters) laboratory, with expertise in experimental model systems for different biofilm-associated infections.

Platforms, networks or clusters

- [NANONET Styria - the Styrian Nanotechnology Initiative](#) was founded as a Styrian nanotechnology network in Autumn 2001. The network supports and focuses existing expertise and interests in the field of nanotechnology and seeks to establish nanotechnology in Styria on a long-term basis.
- [Materials cluster Styria](#) is aimed at assisting the partners of the network within the whole spectrum of the material questions.
- [Clusterland Oberösterreich GmbH](#). Upper Austria has positioned itself as a competent region for clusters and networks. Since 1998, clusters were gradually developed in important economic branches in Upper Austria: automotive, plastics, eco-energy, furniture & timber construction, food, health technology, mechatronics, environmental technology and information technology. In addition, inter-branch networks have been set-up in the fields of human resources, logistics and resource- and energy efficiency. Small & medium sized enterprises (SMEs) are particularly supported.

Regions specialized in nano

The Austrian region/province of Styria is specialized in nanotechnology, with special focus in the fields of HealthTech

According to the eye@RIS3 tool from the S³ platform: the only connection with nano is one of its initial regional capabilities: Materials & production with relation to manufacturing & industry as target market and in connection with the following EU priorities: 1. KETs and 2. Advanced manufacturing systems.

Other information

The Federal ministries of Austria have spent approx. 2.81% of the GDP into research and technology development. They are aiming on increasing this quota in the next few years to more than 3.5% of GDP which will significantly contribute to the further development of a leading role for Austrian research community.

Austria recently was selected to receive 4 out of 5 pilot line projects within the HORIZON 2020 NMPB call 2014 which states the leading role of Austrian research – technology driven as well as in the field of nano-safety and safe by design.

2.2.2 Belgium

BELGIUM



Local/national contact point

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Contact point profile

Pro-Active is a knowledge based company providing services in the fields of:

- Scientific and technological advice – Key Enabling Technologies.
- Innovation management, value chains and forward studies.
- Project design, implementation and management.
- Evaluation and monitoring (ex-ante, ongoing, ex-post).
- Strategy design, road mapping, policy recommendations.
- International Cooperation, LAC.
- Socio-economic analysis, sustainability appraisal and education needs.
- Communication strategy and implementation.

R&D policies, programs and other initiatives supporting nano

In the past decade, industrial policy in Belgium has been mainly in the hands of regional authorities.

Although at federal level no particular integrated policy on KETs has been formulated, at the end of 2008, a policy initiative was taken in the field of nanotech and nano-science. In December 2008, the federal parliament (chamber of representatives) adopted a resolution asking the Belgian government to take actions for promoting a better coordination of the research programs across disciplines, Belgian regions and programs, aiming at creating a critical mass in this field.

A particular point of attention was improving the interaction between public funded research and industry applications – focused on societal needs, market demand and the creation of value added, as well as on creating new approaches for education and training that will fit the future needs of research and industry. Attention was also given to the risks for health, nature and the protection of employees. The resolution also stressed the importance of improving the investment climate for nanotech and nano-science and improving the conditions for FP7

funding.

In Belgium, as research and innovation are under the regional authorities, different trajectories have been adopted in the past decade. In the past, Flanders had a relatively successful policy in establishing Strategic Research Centers for particular technologies, many of which are in or strongly related to the KETs. Well known examples that are relevant for this project are IMEC (micro-electronics and nanotech), VITO (advanced materials and sustainable production) and VIB (bio-tech). Although at the onset the focus was very much on creating synergies in R&D across university and industry labs, later management contracts between these institutes and the Flemish government gradually included more pronounced performance criteria in terms of industry valorization and on industry spin-offs.

Wallonia implemented a cluster-oriented policy with regards to its industrial tissue. In the Walloon Region, the Ministry of Economy, SMEs, Foreign Trade, New Technologies and Higher Education (DG06) is in charge of the regional innovation policy. It is supported by the Agency for Technological Stimulation.

The Brussels-Capital Region is currently developing a policy mix mainly focusing on horizontal issues and some specific niches. The main actor is the innovation agency Innoviris. It is in charge of the implementation of the innovation policy designed by the Ministry of Employment, Scientific Research, Trade, Foreign Trade, Health, Medium Class Training and Public Function.

Relevant projects

Belgium (Wallonia region) participates in the following ERA-NETs related to nano:

- [SINN ERA-NET](#): promotes the safe and rapid transfer of European research results in nanoscience and nanotechnology (N&N) into industrial applications

Some examples of key collaborative projects at EU level are listed below :

- [Nanora – Nano Regions Alliance](#). Interreg project aimed to facilitate the market entrance of Nano-SME through a transnational linking of regional support schemes, the development of new, transnational support structures and the set-up of transnational competence pools. Six countries are represented: France, Germany, Ireland, Belgium, The Netherlands and Bulgaria.
- [European Soft Matter Infrastructure \(ESMI\) \(FP7\)](#). The central objective of ESMI project proposal is to create a top-level interdisciplinary research infrastructure available to a broad European soft matter research community. The ESMI infrastructure consists of experimental platform, synthesis platform and supercomputing platform.
- [PRIME-XS](#). (FP7) Provides an infrastructure of state-of-the-art proteomics technology to the biological and biomedical research community in Europe. Project partners provide access to their technology at six access facilities distributed over Europe (VIB Proteomics Unit -Ghent, BE) In addition, they develop new technologies to better aid the research community in answering scientific questions, and organize a wide range of meetings, courses and training events.
- [Advanced European Infrastructures for Detectors at Accelerators \(AIDA\)](#). More than 80 institutes and laboratories from 23 European countries are involved in the project as [beneficiaries or associate partners](#). This 26 million Euro project receives 8 million Euros from the EU under the FP7 Research Infrastructures programme. It aims to upgrade, improve and integrate key European research infrastructures and develop advanced detector technologies for future particle accelerators (LHC upgrade, Linear Colliders, Neutrino facilities and Super-B factories) in line with the [European Strategy for Particle Physics](#). The project is coordinated by [CERN](#).

Main RTD players and infrastructures in the country/region

Main research and other support infrastructure facilities related to nanotechnology or other KETs are listed below:

- [VITO](#). Independent and customer-oriented research organisation, they are also part of open-access initiatives, such as [QualityNano](#).
- [SIRRIS](#). Non-profit organisation whose main competences in nano are nano-powders synthesis, functionalization and characterization.
- [IMEC](#). Non-profit organisation performing world-leading research in nanoelectronics.

Platforms, networks or clusters

- [NanoWal: Wallonia Network for nanotechnologies](#) gathers the academic laboratories, the research centers and the industries active in the fields of nanosciences and nanotechnologies in the Wallonia Region of Belgium and in Brussels, in order to enhance both Belgian competencies and activities in those fields.

Regions specialized in nano

According to the eye@RIS3 tool from the S3 platform, Belgium regions include under the EU priorities 1. KETs and 2. micro/nano electronics the following:

Flemish region (capital Brussels):

- Micro- and nano-electronics and embedded systems, mechatronics - part of 'Smart systems' smart specialisation domain.

Belgium regions include under priorities 1. KETs and 2. the following:

Flemish region (capital Brussels):

- Advanced production technologies and additive manufacturing. Part of 'Specialised manufacturing solutions' smart specialisation domain. (2. Advanced manufacturing systems).
- Structural materials, nano-materials, self-healing materials, recyclable materials and materials for energy and light. Part of 'Specialised manufacturing solutions' smart specialisation domain. (2. Advanced materials).
- Agricultural and industrial applications of biotechnology and sustainable chemistry, with focus on the development of new bio based value chains, plastics, technical textiles, etc. Part of 'Sustainable chemistry' smart specialisation domain. (2. Industrial biotechnology).
- Pharmaceutical applications of biotechnology, with focus on clinical trials, neuro-degenerative and infectious diseases, molecular diagnostics, and nanotechnology for medical applications. Part of 'Sustainable chemistry' smart specialisation domain (2. Industrial biotechnology).
- Micro-optical modules and micro-photonics systems. Part of 'Smart systems' smart specialisation domain (2. Photonics).

Wallon region (capital Namur):

- Sustainable materials (2. Advanced materials).

Other information

On 2013, the Belgian Federal Public Service for Health, Food Chain Safety, and Environment notified the European Commission of a draft decree that would create a register of substances manufactured at the nanoscale based on declarations of products containing such substances by the parties placing these products on the market in Belgium.

The draft decree would apply from January 1, 2015, for nanomaterials and substances containing nanomaterials, and from January 1, 2016, for articles or complex objects that contain a substance in a nanoparticle state. More info available [here](#).

2.2.3 Brazil

BRAZIL



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Contact point profile

The Brazilian Agency for the Regional Development (ADRAM) was founded in June, 2003 by five institutions: the Enterprise Association of Tubarao City (ACIT), the Enterprise Association of Braço do Norte City/SC (ACIVALE), the Euvaldo Lodi Institute representing to the Santa Catarina State Industries Federation (IEL/FIESC), the SEBRAE System, the Association of Municipalities of Laguna/SC Region and the University of South of Santa Catarina State (UNISUL).

In 2004 was recognized by the Federal Minister of Justice as an Organization of the Civil Society of Public Interest, a federal figure for social organizations that allow it to contract directly with the public administration. In 2010 it was recognized as an Organization of Public Utility by the local administration of Tubarão City.

ADRAM is the Institution of Research & Development for the local Enterprise Association and it is the link between the industrial sector and the academia. It has a minimal research staff that it is hired by project being developed and a permanent management staff.

Its main institutional objectives are related to the promotion of the local and regional development, including the following areas of interest: the link industry – academy (including the technology transfer from the academic sector to the industrial sector), tourism planning for sustainable development, new environmental technologies and solutions, economic and social development, research on new materials for industrial use, social impact of new technologies, and so on.

R&D policies, programs and other initiatives supporting nano

R&D programmes

The Brazilian Initiative of Technology (IBN) aims to integrate and strength the governmental actions to promote the competitiveness of the Brazilian industry based in nanotechnologies. It is a governmental project whose main objective is to make Brazil a scientific, technological and economic competitive country in the generation and utilization of nanotechnology as the leading engine of the economic development.

Specific regulations on nano

Nowadays, no specific regulation on nanotechnology has been approved, but a deputy bill on the National Policy on Nanotechnology including research, production and destination of waste materials and the use of nanotechnology in the country is waiting for its approval by the Brazilian Congress since 2013.

Specific skill&education programmes

No official educational programs have been registered at basic and secondary formal education. At the university level many undergraduate and graduate programs are offered, the main ones are listed below:

- Nanotechnology Engineering (undergraduate level) - Pontifícia Universidade Católica do Rio de Janeiro (PUC – Rio).
- Bachelor on Nanotechnology (undergraduate level) - Universidade Federal do Rio de Janeiro (UFRJ)
- Nano Science (master degree) - Centro Universitário Franciscano (Unifra).
- Nanotechnology (undergraduate level) - UNIP - Universidade Paulista

Relevant projects

In 2013, 10 R&D and infrastructure projects were funded with 47 M € from the government of Brazil.

Also, Brazil has participated in several FP7 NMP projects, most relevant are listed below:

- [MACAN](#) (2009-2013): Merging atomistic and continuum analysis of nanometer length-scale metal-oxide systems for energy and catalysis applications, in which Pontifical Catholic University of Rio de Janeiro participates.
- [EULASUR](#) (2009-2012): Network in Advanced Materials and Nanomaterials of industrial interest between Europe and Latin American Countries of MERCOSUR (Argentina-Brazil-Uruguay), in which the Federal University of Minas Gerais and Campinas State University participate.
- [NEURONANO](#) (2009-2012): Do nanoparticles induce neurodegenerative diseases? Understanding the origin of reactive oxidative species and protein aggregation and misfolding phenomena in the presence of nanoparticles, in which the Federal University of Ceara participates.

Main RTD players and infrastructures in the country/region

Main research and other support infrastructure facilities related to nanotechnology or other key enabling technologies (KETs) are listed below:

- [Cesar Lattes Nanoscience and Nanotechnology Centre \(C2Nano\)](#), located at Brazilian Synchrotron Light Laboratory, Campinas, SP.
- [Nanoscience and Nanotechnology Multiuser Laboratory \(LabNano\)](#), located at the Brazilian Centre for Physics Research, Rio de Janeiro, RJ.
- National Nanotechnology Laboratory for Agribusiness (LNNA), located at the Brazilian Enterprise on Agricultural Research (Embrapa), São Carlos, SP.
- National Institute of Science and Technology in Nanobiopharmaceutical (located at the Federal University of Minas Gerais, MG).

- National Institute of Science and Technology in Nanobiotechnology in the Midwest and North, located at the University of Brasilia, DF.
- [National Institute of Science and Technology in Nanobiotechnologies and Nanobiomolecular Simulation \(INCT NanoBioSimes\)](#), located at the Federal University of Ceará, CE.
- [National Institute of Science and Technology in Materials Science and Nanotechnology \(INCTMN\)](#), located at the Paulinian State University, SP.
- [National Institute of Science and Technology in Catalysis and Nanostructured Molecular Systems](#), located at the Federal University of Santa Catarina, SC.
- [National Institute of Science and Technology in Functional Complex Materials](#), located at Campinas State University, SP.
- [National Institute of Science and Technology in Micro and Nanoelectronics Systems](#), located at Campinas State University, SP.
- National Institute of Science and Technology of Carbon Nanomaterials, located at the Federal University of Minas Gerais, MG.
- [National Institute of Science and Technology of Semiconductor Nanodevices](#), located at the Pontifical Catholic University of Rio de Janeiro, RJ.
- [National Institute of Science and Technology in Nanotechnology for Integrated Labels](#), located at the Federal University of Pernambuco, PE.

All the National Institutes on Science and Technology are funded by the Science and Technology Minister.

Platforms, networks or clusters

26 National Network have been registered and are funded by the Science and Technology Minister. Those more relevant are listed below:

- [The CETENE Nanotechnology Network](#): The CETENE Nanotechnology Network consists of 26 Associate Laboratories located in 11 research and education institutions from six northeastern states. The Network comprises more than 100 researchers specialize in various areas of scientific and technological research and has a modern laboratory and instrumental infrastructure. The Network is mapping regional expertise in nanotechnology, promotes closeness between researchers with expertise in related fields and seeks to provide channels of communication between these and the industrial sector to the structuring of thematic cooperation projects of regional interest.
- Nanofotônica Network
- Nanobiotecnologia e Sistemas Nanotestruturados National Network
- Nanotecnologia Molecular e de Interfaces National Network
- Pesquisa em Nanotubos de Carbono National Network
- Nanocosméticos: do Conceito às Aplicações Tecnológicas.
- Microscopias de Varreduras de Sondas Rede Nacional de Simulação e Modelagem de Nanoestruturas e Materiais Complexos National Network
- Revestimentos Nanoestruturados Cooperative Research Network on Nanoglicobiotechnology National Network
- Nanobiomagnetismo National Network

- Nanotecnologia, Sociedade e Meio Ambiente Research Network
- Brazil – Argentina Center on Nanotechnology
- Brazilian & Mexican Virtual Center on Nanotechnology
- Latin American Society on Nanotechnology Network
- AgroNano Network

2.2.4 Chile

CHILE



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Contact point profile

Eurochile is a private institution created by the government of Chile and the European Union in 1992, sectorized to the Ministry of Economy, incorporated under the laws of Chile, in charge of promoting and strengthening economic, industrial and technological cooperation between companies and institutions from Chile and the European Union, aiming to support SMEs in their internationalization process and increase their management, innovation, training, production and marketing capabilities.

Eurochile is a member of the Consortium formed to implement the project “Nanoscience, nanotechnologies, materials and new production technologies deployment in Latin American countries”, along with other 11 partners from 10 European and Latin American countries.

R&D policies, programs and other initiatives supporting nano

R&D policies and programs

Federal funds in Chile started promoting R&D in nanotechnology in the 90s of last century. In 1997, the National Commission of Science and Technology (CONICYT) opened its Centers of Excellence via the Program of Advanced Research in Strategic Areas (FONDAP). One of its priority areas was nanotechnology, and FONDAP funded in 1999, the Center of Advanced Interdisciplinary Research in Science of Materials in the University of Chile. Another funding for nanotechnology came from the World Bank.

The Scientific Millennium Initiative (SMI), encouraged by the World Bank, was implemented in Chile as the prototype to be further developed in other countries. In 1999, the Chilean Government created the National Commission of Millennium Initiatives. In consequence, the World Bank granted a loan of US \$5 million for the first stage of two-and-a-half years on top of the US \$10 million provided by the national government. In the first stage of the SMI three institutes and five nuclei were created. One of them was created to perform nanotechnology research (Physics of Condensed Materials), headquartered in the Federico Santa María Technical University. During the second stage, five research nuclei were created, but none of them oriented towards nanotechnology research. For the third stage, inaugurated in 2002 and implemented in 2003, a new project related to nanotechnology research was approved. It was

headquartered at the Andrés Bello University (Material science and nanotechnology, organic physiochemical and theory of densities) and the program of Physics of Condensed Materials was extended for another three years.

Other initiatives

[CEDENNA](#) (Center for the Development of Nanoscience and Nanotechnology) is consolidating a multidisciplinary group working together in basic and applied science, with interesting results, starting a relationship with industries and companies (which is unusual in Chile), preparing a large number of students in emerging areas, strengthening important relationships between national and international institutions and developing a strong outreach program that reaches more than 300,000 people each year.

Relevant projects

Between 2007 and 2013, Chile has participated in 52 FP7 projects, 3 of them in the framework of NMP program:

- [CROPS](#): **Intelligent sensing and manipulation for sustainable production and harvesting of high value crops, clever robots for crops** (2010-2014), in which Chilean Agriculture Research Institute participates.
- [ECLIPSE](#): **Renewable eco-friendly poly(lactic acid) nanocomposites from waste sources** (2012-2015), in which Chilean Catholic Pontifical University and Antarctic Seafood, both from Chile, participate.
- [NMP-DeLA](#): **Nanoscience, nanotechnologies, materials and new production technologies deployment in Latin American countries** (2013-2015). The main objective of the project is to develop a series of activities between Europe and Latin America to strengthen local research and training potential as means to achieve the implementation of nanomaterials technologies in the areas of greatest social challenge in Latin America: energy, water and health. All this, in the context of improving the quality of life and industrial competitiveness in areas where nanotechnology has growth potential. The deployment of advanced materials will have to provide solutions to the social challenges of specific regions in health care, clean energy and environment.

Main RTD players and infrastructures in the country/region

Chile has some research groups headquartered at the main universities of the country, mostly addressing drugs and therapies research.

The most important research center in nano is [CEDENNA](#) (Center for the Development of Nanosciences and Nanotechnology), set in 2009 and currently formed by 50 researchers and 150 graduate and undergraduate students from 9 universities throughout Chile. 50% of its publications are partnerships with 33 countries representing 9 formal networks.

CEDENNA has a series of laboratories associated with the University of Santiago, University of Chile, Chilean Catholic Pontifical University, Metropolitan Technological University, Andrés Bello University and Federico Santa María University, to conduct groundbreaking research.

Platforms, networks or clusters

The most important networks in which Chile participates are listed below:

- **NanoAndes network** was set in Lima (Peru) in 2010, supported by Peruvian researchers in nano and the Peruvian-French Association “Puya de Raimondi”. It is formed by Chilean, French, Venezuelan, Colombian, Ecuadorian, Peruvian, Bolivian,

Argentinean and Costa Rican researchers.

- [RedCLARA](#) (Latin American Cooperation of Advanced Networks) is a non-profit International Law Organisation set in 2003, develops and operates the only Latin American advanced Internet network that was established for regional interconnection and linked to GÉANT2 (pan European advanced network). It is constituted by 15 Latin American countries (Argentina, Bolivia, Brazil, Colombia, Costa Rica, Chile, Ecuador, El Salvador, Guatemala, Mexico, Panama, Paraguay, Peru, Uruguay and Venezuela).

Other information

The focus of nanotechnology applications in Chile is on food exports, mining, water remediation, etc. Most of these problems are common to the Andean countries, where the geography and levels of development are similar to Chile. It is therefore essential to create collaborative networks that allow synergies between countries and promote joint collaborations.

Nowadays, bibliometric studies position Chile in fourth place in scientific articles on nanotechnology in Latin America (Brazil 53.3%, México 23.8%, Argentina 16%, Chile 6.9%), although there is yet no national policy for the promotion of nanotechnology. Nanomedicine is not a strong topic within the nanotechnologies research areas in Chile.

2.2.5 Colombia

COLOMBIA



Local/national contact point

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Contact point profile

The Department of Chemistry is the basic academic unit within the Faculty of Science of Bogotá, responsible for academic and administrative management of curricula for undergraduate and graduate in chemistry, academic services for all those careers whose curricula require knowledge in chemistry, development of research projects and consulting and outreach to the community in the field of chemistry.

Dr. Álvaro Duarte leads one of its research groups: “New materials: fullerenes and carbon nanotubes”, and is currently working in the areas of synthesis and characterization of Pt, Pd and Ni supramolecular squares and synthesis of iron nanoparticles.

R&D policies, programs and other initiatives supporting nano

The [National Advisory Council of Nanoscience and Nanotechnology](#), to which Dr. Álvaro Duarte belongs, is currently working in the development of some regulation on nano.

Relevant projects

A repository of specific projects in thematic nano funded within Colombian public programs is not available.

Main RTD players and infrastructures in the country/region

Two years ago, an initiative involving several universities and a public company was set in order to launch the first nanotechnology center in Colombia, but ultimately not carried out. Currently there are no major infrastructures related to nanotechnology in the country.

Platforms, networks or clusters

[Colombian Network of Nanoscience and Nanotechnology](#)

This network is aimed at:

- Facilitate coordination between researchers, centers, institutes, universities, industry and government through interdisciplinary projects, thematic and laboratory networks, as well as joint activities to strengthen the generation and dissemination of knowledge, innovation and development in the area of nanoscience and nanotechnology.
- Advise on strategic planning for investment, infrastructure, technology transfer and regulation in nanoscience and nanotechnology.
- Collect and manage information through a system of observation, measurement, evaluation, analysis, projection, resources and activities at national and international level in the field of nanoscience and nanotechnology.
- Promote and coordinate the dissemination of nanoscience and nanotechnology to the society.
- Facilitate and manage exchange and mobility of researchers and students from different institutions that are part of the network.
- Encourage and strengthen integration and joint work with international organizations and networks.
- Promote studies of social, environmental and economic impact of nanoscience and nanotechnology.
- Promote entrepreneurial and innovation initiatives in the area of nanotechnology and contribute to its development in conjunction with public and private entities.
- Develop, coordinate and implement projects and joint research programs related to the areas of interest.
- Develop and publish informative, educational and specialized dissemination material in nanoscience and nanotechnology.
- Conduct symposia, seminars, conferences and other activities involved with outreach, promotion and development of nanoscience and nanotechnology in Colombia.
- Manage fundraising and development of interinstitutional exchange and mobility activities.

2.2.6 Costa Rica

COSTA RICA / CENTRAL AMERICA



Local/national contact point

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Contact point profile

Ricardo Alvarado is a full-time researcher at the National Nanotechnology Laboratory (LANOTEC) in Costa Rica. Some of his current projects involve the development of antimicrobial nanomaterials, evaluation of the novo bacterial resistance to nanomaterials and genetic engineering of bacteria.

LANOTEC is an interdisciplinary research area whose mission is the scientific and technological development through the application of nanoscience and nanotechnology to problem solving and knowledge transfer from academia to industry. It was opened on August 31st, 2004 and it is specialized in the research, design and implementation of technologies associated with nanotechnology, computational nanoscience / nanotechnology and materials science.

R&D policies, programs and other initiatives supporting nano

The director of LANOTEC, Jose Roberto Vega Baudrit, is coordinating with the Ministry of Science, Technology and Telecommunications (MICITT) and the Ministry of Public Education (MEP) the establishment of a National Nanotechnology Plan which would support the development of nanotechnology in Costa Rica,

By the moment, there is no graduate program in nanotechnology, but the Costa Rica Technological (TEC) offers a 12 months program of “Technician in nanotechnology”.

Also, LANOTEC is investing a relevant amount of effort in the outreach program “Nanoprofessor”, which aims to be an introduction to nanotechnology for secondary school students.

Relevant projects

- Nanotechnology outreach to promote scientific vocations
- Novel third generation solar cells based on carbon nanostructures

- New generation diagnostic methods for infectious diseases
- Generation of de novo bacterial resistance to antimicrobial nanomaterials
- Strategic actions to strengthen capacities in the diagnostics and treatment of cancer with a comprehensive approach
- Design and development of an eco-friendly molded biofoam with micro/nanostructures using renewable sources

Main RTD players and infrastructures in the country/region

At national level, there is only one laboratory dedicated to nanotechnology: [LANOTEC](#), which has a working area of **300 sq m**, a clean room equipped for synthesis and characterization of nanomaterials, a laboratory for fabrication of nanostructured materials and sample preparation, and high performance computing equipment to simulate physical and chemical phenomena and high-level visualization.

Also, there are several facilities located at the main state universities which also perform research in nanotechnologies. In this sense, the [University of Costa Rica \(UCR\)](#), the [National University \(UNA\)](#) and the [Costa Rica Technological \(TEC\)](#) have established bilateral collaboration agreements with LANOTEC in order to facilitate and enhance research efforts.

On the other hand, LANOTEC is located at the National Center for High Technology (CeNAT) which also includes other national KETs laboratories such as the National Center for Biotechnological Innovations (CENIBiot) and the National Collaborator Centre for Advanced Computing (CNCA).

Platforms, networks or clusters

Specifically in Costa Rica, there are few platforms for KETs. In the case of nanotechnology, there is only one network: nanoUNA.

However, Costa Rica is part of multiple international networks in nanotechnology such as:

- *NANO*utures
- BIONNA: Bioinnovation for America
- RIN: Iberoamerican Nanotechnology Network
- RELANS: Latin-American Network of Nanotechnology and Health
- NanoAndes: Cooperation in Andean region and other countries
- CYTEC: Communication of Science, Technology and Innovation
- EFANE: Future Scenarios of the Applications of Nanotechnology in Education
- NANOSLAP: Virtual Community for Development in Nanotechnology
- CLARA: Latin-American Cooperation of Advanced Networks
- PNN: Pan-American Nanotechnology Network
- CTCAP: Commission for the technological development of Central America and Panamá
- NANODYF-CYTED: Diffusion of knowledge
- NANOENERGIA-CYTED: Cooperation in Nanoenergy

Other information

The Government has included nanotechnology as one of the strategic milestones for development in the document "Strategies XXI Century".

Furthermore, the Ministry of Science, Technology and Telecommunications (MICITT) has officially declared the nanotechnology research and its direct and indirect applications as of public interest. This declaration is a call to encourage public and private entities to economically, logistically and technologically contribute to the scientific research in this area.

2.2.7 Finland

FINLAND



Local/national contact point

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Contact point profile

Spinverse is a technology consulting company and has been coordinating large scale innovation programs for the governments with a total volume of 1 BEUR. Today, the company is the leading EU funding expert and innovation consulting firm in Finland.

Christiane Hepp has been actively involved in research commercialization, open innovation activities and market entry projects in the field of nano and other emerging technology areas. Her expertise ranges from business consulting, clusters and innovation policy on a national and EU level to business development. She also helps companies accessing funding and networks and was the behind the scenes key player to create successful high-impact tech events and science-to-public promotion and communication activities. She has worked with the top companies investing in R&D, SMEs and start-ups in the automotive, automation, ICT and clean-tech industry in Europe.

R&D policies, programs and other initiatives supporting nano

While in the past funding activities and programmes by Tekes, the Finnish Funding Agency, have been very much focused around specific technology areas (like nanotechnology), the new support mechanisms have evolved to strong industry and application-oriented innovation programmes in the open innovation ecosystem. In addition to Tekes activities, the Finnish industry has recognized the importance and value of national public-private partnerships, the so-called SHOKs, in which they heavily invest and engage with research institutions.

- **Tekes**: the Finnish Funding Agency for Technology and Innovation.
- **SHOKs**: Strategic Centres for Science Technology & Innovation. In addition to Tekes, Finland has initiated a new kind of strategic networks for industry and research: SHOKs were established as a policy concept in 2007 and organized around public-private partnerships. The aim here was to help accelerate the process of innovation and renew Finland's industrial clusters by creating new competences and inducing radical innovations at the system level. These SHOKs have become in the last five years become one of the main instruments of Finnish innovation policy and perhaps even its "flagship" program. Currently there are 6 Centres in operation: Cleen (environment &

energy sector), FIMECC (metals & engineering sector), SaIWe (health & well-being sector), DIGILE (ICT & digital services sector), RYM (built environment sector) and IBIC (bioeconomy). Between 2008 and 2012, Tekes funded these SHOK programmes with a total of EUR 343M. An average of 40% of research conducted in the SHOKs are, or will be, co-funded by the companies involved.

Other agencies:

- [TE-keskus](#): The Employment and Economic Development Centres.
- [Suomen Akatemia](#): Academy of Finland.
- [Finnvera plc](#): official Export Credit Agency (ECA) of Finland.

Main RTD players and infrastructures in the country/region

- [Aalto University](#)
- [University of Helsinki](#)
- [University of Eastern Finland](#)
- Tampere University of Technology
- [University of Turku](#)
- [Åbo Akademi University](#)
- Lappeenranta University of Technology
- [VTT Technical Research Centre of Finland](#)
- [Finnish Meteorological Institute FMI](#)
- [KCL](#)
- [The Centre for Metrology and Accreditation MIKES](#)
- [The Finnish IT Center of Science CSC](#)
- [Finnish Institute of Occupational Health FIOH](#)
- [Micronova](#)
- [Center for New Materials \(UMK\) at Helsinki University of Technology](#)
- [Graduate School on New Materials and Processes](#)
- [IPR University Center, University of Helsinki](#)
- [Keksintösäätiö - Foundation for Finnish Inventions](#)
- [Otaniemi International Innovation Centre](#)
- [FinnMedi Oy](#)
- [Hermia Business Development](#)
- [Joensuu Science Park Ltd.](#)
- [Kuopio Innovation](#)
- [Miktech Oy](#)
- [Business Oulu](#)
- [PrizzTech Oy](#)
- [Technology Centre KETEK Ltd.](#)
- [Turku Science Park](#)
- [Lappeenranta Business & Innovations](#)
- [Digipolis](#)

Platforms, networks or clusters

- [Fine particle forum](#)
- [Cleantech Finland](#)
- [CLEEN](#)
- [FIBIC](#)
- [FIMECC](#)
- [RYM](#)
- [SalWe](#)
- [MemsCat](#)
- [Photonics Finland](#)
- [PrintoCent](#)
- [Nano Lab Finland](#)
- [Hengityslitto - Pulmonary Association HELI](#)
- [Allergy and Asthma Federation](#)
- [Enterprise Finland](#)

Regions specialized in nano

Most active regions are Helsinki Region, Joensuu, Jyväskylä, Kokkola, Lappeenranta, Mikkeli, Oulu, Tampere and Turku.

According to the eye@RIS3 tool from the S3 platform, Finnish regions include under the EU priorities **1.KETs and 2.nanotechnology**:

Etela-Savo:

- Smart, functional materials

Finnish regions include under priorities **1. KETs and 2.** the following:

Helsinki-Uusimaa (capital: Helsinki):

- Technological solutions and services

Varsinais-Suomi (capital: Turku):

- Smart Bioenergy (2. Advanced materials)

Stakunta (capital: Pori):

- Bio economy. Research on bio products and biorefineries preparing the bio based economy (2. Industrial Biotechnology).
- Traditional process industry (2. Advanced manufacturing systems).
- ICT, KETs and manufacturing technologies (2. Photonics).

Pirkanmaa (capital: Tampere):

- Renewable industry: intelligent machines, advanced manufacturing, industrial internet, information and communication technology (ICT) (2. Advanced manufacturing systems).
- Health of future: human spare parts, medicines, biomedical systems and devices, health services (2. Industrial biotechnology).

Etela-Karjala:

- Separation technology and material knowledge (2. Industrial biotechnology).
- Solutions based on special know how in real-time simulation of dynamics, multitechnical systems and virtual engineering (2. Advanced manufacturing systems).
- Technologies required in conversion from traditional drive trains into electric or hybrid electric (2. Advanced manufacturing systems).
- Waste utilisation in composite based products (2. Advanced materials).

Pohjois-Karjala (capital: Joensuu):

- Forest based bioeconomy (and renewable energies) (2. Industrial biotechnology).
- Technology and materials (photonics, mining, broadband issues) (2. Advanced materials).

Pohjois-Savo (capital: Kuopio):

- Wood processing & biorefining (2. Advanced materials).
- Mechanical industry and energy technology (2. Advanced manufacturing systems).

Etela-Pohjanmaa (capital: Seinajoki):

- Materials production, research and development of intelligent materials for buildings and industry (2. Advanced materials).

Pohjois-Pohjanmaa (capital: Oulu):

- ICT and software applications for industry (2. Advanced manufacturing systems).

Lappi (capital: Rovaniemi):

- Traditional process industry (2. Advanced manufacturing systems)

Other information

In Finland, nanotechnology covers a variety of different sectors, and companies have been discovering the opportunities service business (Over 50% of the respondents have commercially available products and over 90% are at least at research stage):

- Services (26%)
- Tools & instruments (16%)
- ICT & electronics (12%)
- Metals & mechanical engineering (11%)
- Chemical industry (9%)
- Energy & environment (4%)
- Health & well-being (4%)
- Pharma (4%)
- Other (14%)

2.2.8 France

FRANCE



Local/national contact point

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Contact point profile

NanoThinking is a consulting company dedicated to innovation through nanotechnology. They provide specific nanotech services to industrials, research centers and public institutions such as:

- Project coordination
- Market study
- Technical study
- Map of competencies
- General study
- Regulation & EHS watch

NanoThinking has also released the NanoTechMap: online exhibition of nanotechnology featuring over 4,000 innovative companies worldwide.

R&D policies, programs and other initiatives supporting nano

R&D programmes

- [NanoMet](#): French project on nanometrology for SMEs.

Specific regulations on nano

- [French National Declaration on NanoMaterials](#): declaring substances with nanoparticle status is mandatory in France since 2010 (articles L. 523-1 to L. 523-8 of the French Environmental Code and Article L. 5161-1 of the French Public Health Code, created by Article 185 of the Act No. 2010-788 of 12 July 2010 concerning the national commitment in favour of the environment, known as "Grenelle II"). A [website](#) has been set up on which the various companies concerned can each create an account and submit their annual declarations.

Specific skill&education programmes

- [Observatory for Micro and NanoTechnologies – OMNT](#). Joint unit between the CEA and the CNRS created in 2005. Thanks to a network of more than 300 experts, the OMNT carries out a continuous scientific watch on key topics of micro and nanotechnologies. The OMNT provides stakeholders from research and the economic world with analysis supporting them to understand the evolution of these technologies.

Relevant projects

- [NanoMet](#). The project aims to improve the industrial feasibility of processes involving nanomaterials by providing the French companies with reliable and reproducible protocols for the measurement of key parameters characterizing nano-object.
- [ARP Nanosciences and Nanotechnologies](#). Coordinated by CNRS and CEA, the project aims to propose a vision of future scientific and technological breakthroughs, opportunities for industrial development and the economic and societal impact associated with the development of Nanoscience and Nanotechnology.

Plenty of other initiatives by technological clusters, such as Plastipolis, MINALOGIC and Cosmetic Valley and by research institutions, such as NanoMines, NanoScoop and RENATECH are now ongoing.

France is characterized by a rich and complex landscape of technological transfer involving many different stakeholders segmented by thematic, geography, TRL, types of intervention, etc.

An example of key collaborative projects at EU level is listed below :

- [Nanora – Nano Regions Alliance](#). Interreg project aimed to facilitate market entrance of Nano-SME through a transnational linking of regional support schemes, the development of new, transnational support structures and the set-up of transnational competence pools. Six countries are represented: France, Germany, Ireland, Belgium, The Netherlands and Bulgaria.

Main RTD players and infrastructures in the country/region

The most up-to-date source of information about nanotechnology players (industrials, start-ups, research centers and others players) in France is available [here](#).

Platforms, networks or clusters

- [French National Nanofabrication Network – RENATECH](#). The programme entitled "A national network of large technological facilities and Basic Technological Research (BTR) in micro and nanotechnologies" was launched in 2003. The set up of the network of large technological facilities is a far-reaching action of the direction of technology of French Ministry of Research. Its objective is to allow the national research organisations (CEA - Atomic Energy Commissariat, CNRS - National Centre for Scientific Research, Universities, etc. ...) to benefit of a competitive infrastructure at world level for carrying out R&D projects that require top level equipment in micro- and nano- technologies.
- [Centres of Competence in Nanosciences C'NANO](#). Six Centres of Competence in Nanosciences called "C'Nano" were created in an Interdisciplinary Research Programme that aims to foster scientific communication, structure research at the regional level and serve as an entry point and as a counselor.
- [French digital cluster for micro- and nanoelectronics and software – MINALOGIC](#), brings together the Rhône-Alpes region's leading innovators in the field of smart

miniaturized systems. The micronanoelectronics workgroup focuses on micro- and nano-electronic hardware technologies, physical design (CAD) tools and libraries, packaging techniques, including "in-package system" and "package-on-package", and solid-state electronic components.

- [NanoValley Trinational European Technology Region](#) involves entities from Germany, France and Switzerland. It is a high-tech initiative to support innovative activities in SMEs. Its major goal is the transfer of research results into products and new businesses.

Regions specialized in nano

Most active regions are the south of Paris (Ile de France) and the Lyon-Grenoble region close to the French Alps.

According to the eye@RIS3 tool from the S3 platform, French regions include under the EU priorities **1. KETs and 2. micro/nano electronics** the following:

Aquitaine (capital: Bordeaux):

- Embedded networking software and connected objects

Limousin (capital: Limoges):

- Electronics

Centre (capital: Orleans):

- The design of systems of energy storage, chemical and electrochemical, consists of assembling components - technical (converters, electrodes, etc.) and chemicals (electrolytes, etc.) - in all technologies (Lithium-ion battery, Vanadium, etc.) and in all formats in order to create units of immediate energy transfer.

French regions include under priorities **1. KETs and 2.** the following:

Midi-Pyrenees (capital: Toulouse):

- Conception and development of new biological tools for the production of new chemical molecules based on the utilisation of renewable carbon (2. Industrial biotechnology).
- Advanced materials and new processes in the aeronautical sector (2. Advanced materials).

Poitou-Charentes (capital: Poitiers):

- Advanced materials and reduction of environmental impact in transport systems (2. Advanced materials).

Aquitaine (capital: Bordeaux):

- Chemicals as source of conception of new materials (2. Advanced materials).
- Development of sustainable bio-source chemicals (2. Industrial biotechnology).
- Support the development of the existing industrial and research excellence in laser, photonics and medical imagery (2. photonics).

Limousin (capital: Limoges):

- Ceramics (2. Advanced materials).
- Mechanics (2. Advanced manufacturing systems).

Centre (capital: Orleans):

- Biotechnologies and services for health and cosmetic industries: this domains covers the provision of services outsourced by the players in the cosmetics industry and health (pharmaceuticals and medical device) which aims to stimulate the dense regional subcontractors network (2. Industrial biotechnology).

Rhone-Alpes (capital: Lyon):

- Smart&energy-efficient buildings (2. Advanced materials).

Bourgogne (capital: Dijon):

- Advanced materials and production processes (2. Advanced materials).

Auvergne (capital: Clermont-Ferrand):

- Biotechnologies (2. Industrial biotechnology).

Other information

Many public and private initiatives are in preparation and could start in 2015, but there is not public information available yet.

2.2.9 Germany

GERMANY



Local/national contact point

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Contact point profile

microTEC is active in own research and industrialization in the field of applied micro and nanotechnologies and is additionally acting as a supporter of nanotechnologies e.g. as a member of the technical advisory board of Rhineland-Palatinate, board member of EuroNanoForum, NRW Nano Conference and with several other actions. On behalf of NANO*utures*, microTEC is taking care of linking the European approach of NANO*utures* (and its related projects Value4Nano, NanoEIS, NanoDiode, a.s.o) to the German measures and vice versa. A special focus is given to support SMEs to benefit from the networking events and facilitate their involvement into R&D projects.

R&D policies, programs and other initiatives supporting nano

The Federal Government has the goal to use nanotechnology to contribute to growth and innovation in Germany, to make nanotechnology safe and sustainable, to tap the potential of nanotechnology in education and research and to tap the potential of nanotechnology to meet global challenges. In particular, it wants to secure the contribution of nanotechnology to the protection of the environment and climate, to the securing of energy supply and the creation of a knowledge bioeconomy; use the possibilities of nanotechnology for health; and for sustainable agriculture and food safety; and achieve environmental and energy saving mobility through nanotechnology.

R&D funding

- Funding guidelines for the program [NanoChance](#).
- [VDI Technologiezentrum - new materials and nanotechnologies](#): for academic teams and cooperative research.

Specific regulations on nano

- There is no specific regulations nowadays in Germany, but [special provisions for workers' protection](#).

Specific skill&education programmes

- Several education programs on nanotechnology are running nowadays at high schools and universities, and being communicated to the youngsters via [NanoTruck website](#).

Relevant projects

- [Nanora – Nano Regions Alliance](#). Interreg project aimed to facilitate market entrance of Nano-SME through a transnational linking of regional support schemes, the development of new, transnational support structures and the set-up of transnational competence pools. Six countries are represented: France, Germany, Ireland, Belgium, The Netherlands and Bulgaria.

Also, a detailed report on relevant projects in Germany is available [here](#).

Main RTD players and infrastructures in the country/region

A short overview on infrastructures related to nano is given [here](#). Please take into account that this map is still in progress and not all players are listed yet.

Platforms, networks or clusters

- [NanoInGermany](#) lists companies, projects and initiatives related to nano.
- Each of the 16 regions of Germany has its own nano network and related facilities that can be located by searching [here](#).
- Additionally, several private/public partnerships are supporting nano, e.g. [nanomat](#).
- [cc-NanoBioNet](#) is one of the largest German networks in nanotechnology, which connects universities, research institutes, hospitals, and companies. The non-profit association was founded to enhance the communication between research, economy, politics and the public.
- [NanoValley Trinational European Technology Region](#) involves entities from Germany, France and Switzerland. It is a high-tech initiative to support innovative activities in SMEs. Its major goal is the transfer of research results into products and new businesses.

Regions specialized in nano

Bavaria, Saxony, Rhineland-Palatinate and Saarland

Other information

Germany is strong in industrialization (e.g. based on the success stories of global players like BASF in chemistry and Boehringer Ingelheim in pharma), but also has gained results coming from SMEs and startups (e.g. Saarland), but SMEs and startups are facing a special challenge in transferring this to fast growth by the lack of private venture capital in Germany.

2.2.10 Greece

GREECE



Local/national contact point

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Contact point profile

The Centre for Research and Technology-Hellas (CERTH), founded in 2000, is the only research centre in Northern Greece and one of the largest in the country.

CERTH has important scientific and technological achievements in many areas including: Energy, Environment, Industry, Mechatronics, Information & Communication, Transportation & Sustainable Mobility, Health, Agro-biotechnology, Smart farming, Safety & Security, as well as several cross-disciplinary scientific areas.

In the field of nanotechnology, CERTH is currently working in the development of functional nanoparticles (e.g., polymeric, hybrid, liposomes) for health, food and environmental applications (e.g., targeted drug delivery systems, mucosal delivery, controlled release of active ingredients, environmentally-friendly coatings, separation, etc.).

CERTH participates in several FP7 NMP projects and European initiatives related to nano.

R&D policies, programs and other initiatives supporting nano

R&D programmes:

- National Strategic Reference Framework (not exclusively for nano)

Specific skill&education programmes:

- [Aristotle University of Thessaloniki](#): Inter-disciplinary Postgraduate Programme of Study (IPGP) "Nanosciences & Nanotechnologies - N&N" leading to the acquisition of MSc and PhD.
- [National and Kapodistrian University of Athens](#): MSc and PhD in Microelectronics.
- [National Technical University of Athens](#): Interdepartmental Program of Postgraduate Studies on Microsystems and Nanodevices
- [University of Crete](#): Graduate program in Photonics & Nanoelectronics

Relevant projects

Greece participated in 146 FP7-NMP projects, 27 of them coordinated by Greek Institutions.

Ongoing FP7-NMP projects coordinated by Greek Institutions are listed below:

- [LEEMA](#) - Low Embodied Energy Advanced (Novel) Insulation Materials and Insulating Masonry Components for Energy Efficient Buildings
- [SMARTONICS](#) - Development of smart machines, tools and processes for the precision synthesis of nanomaterials with tailored properties for Organic Electronics
- [NEXT-GEN-CAT](#) - Development of NEXT GENERATION cost efficient automotive CATalysts
- [THEBARCODE](#) - Development of multifunctional Thermal Barrier Coatings and modelling tools for high temperature power generation with improved efficiency
- [STIMULATE](#) - Stimulating the Public Attitude Towards Advanced Materials
- [REFREEPERMAG](#) - Rare Earth Free Permanent Magnets
- [ELISSA](#) - Energy Efficient Lightweight-Sustainable-SAFE-Steel Construction
- [OPTICO](#) - Model-based Optimization & Control for Process-Intensification in Chemical and Biopharmaceutical Systems
- [EURARE](#) - Development of a sustainable exploitation scheme for Europe's Rare Earth ore deposits
- [MF-RETROFIT](#) - Multifunctional facades of reduced thickness for fast and cost-effective retrofitting
- [FIBRALSPEC](#) - Functionalised Innovative Carbon Fibres Developed from Novel Precursors With Cost Efficiency and Tailored Properties

Main RTD players and infrastructures in the country/region

- [National Technical University of Athens](#)
- [National Center for Scientific Research "Demokritos"](#)
- [Aristotle University of Thessaloniki](#)
- [Center for Research and Technology Hellas](#)
- [University of Patras](#)
- [Foundation for Research and Technology - Hellas](#)

Platforms, networks or clusters

- [NanoNet](#): thematic research network on nanotechnologies and nanobiotechnologies
- [Micro & Nano Scientific Society](#)
- [mi-Cluster](#): nano/microelectronics-based systems and applications cluster

Regions specialized in nano

Athens, Thessaloniki, Patras and Crete.

2.2.11 Ireland

IRELAND



Local/national contact point

Victor Acinas

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Contact point profile

CCAN is the national Collaborative Centre for Applied Nanotechnology in Ireland and has access to the Irish nanotechnology network which includes companies and research organizations. CCAN acts on behalf of Irish companies to help them access expertise and funding across Europe so that companies can use and develop the technologies and skills required to drive product innovation in ICT and biomedical industries.

CCAN currently has over 25 members across government, academia and industry. As a public-private partnership between industry, academia and the economic development agencies in Ireland, they have access to the [Nanolreland research pool and analytical facilities](#), full access to labs, including a full CMOS, MEMS and III-V Wafer semiconductor fabrication facility, at Tyndall National Institute, full access to CRANN facilities, including an e-beam lithography (<10nm) and focused ion beam and transmission electron microscopes, at Trinity College Dublin, and other labs at other research partners in Ireland.

R&D policies, programs and other initiatives supporting nano

CCAN runs the only specific funding program for nanotechnology in Ireland. In order to maximize economic benefit to Ireland, the CCAN funding program is focused on developing nanotechnology-enabled solutions for ICT and biomedical companies, with specific focus on applications requiring convergence of ICT and biomedical expertise.

The funding program aims to use the existing research competencies developed through government funding (SFI, EI, HEA, etc.) over the past 10-15 years to develop nano-enabled solutions to meet clearly identified market needs.

New project proposals are always welcome from companies who require nanotechnology-enabled solutions to current or future product challenges.

Currently active research areas are listed below:

- **2D-3D REGEN:** cell response, nanoimprint technology, tissue scaffold design&manufacture, in vivo & in vitro analysis.

- **Genescope:** microfluidics design & fabrication, diagnostic tests for infectious diseases, surface chemistry-biomolecule immobilization, high brightness nanoparticles, whole blood PCR process.
- **Nanomedic:** biocompatible nanoparticles, pulmonary drug delivery, in vivo testing, in vitro testing.
- **Convergence:** thin film deposition, energy harvesting, power electronics, nanomaterials, MEMs design.
- **LightHAMR:** laser/LED light sources, plasmonic structures, waveguide modeling & fabrication, disk drive design & manufacture.
- **Nano-EI:** electroless coating, atomic layer deposition, pyrolytic carbon deposition, materials characterization.

Relevant projects

- **[Nanora – Nano Regions Alliance](#)**. Interreg project aimed to facilitate market entrance of Nano-SME through a transnational linking of regional support schemes, the development of new, transnational support structures and the set-up of transnational competence pools. Six countries are represented: France, Germany, Ireland, Belgium, The Netherlands and Bulgaria.

Also, a detailed report on relevant projects in Ireland is available [here](#).

Main RTD players and infrastructures in the country/region

- Labs at **[Tyndall National Institute](#)** including a full CMOS, MEMS and III-V Wafer semiconductor fabrication facility.
- Labs at **[CRANN](#)** in Trinity College Dublin including an e-beam lithography (<10nm) and focused ion beam and transmission electron microscopes.

Platforms, networks or clusters

- **[CCAN](#)**: national Collaborative Centre for Applied Nanotechnology.

2.2.12 Italy

ITALY



Local/national contact point

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Contact point profile

Assoknowledge is member of Confindustria Servizi Innovativi e Tecnologici (Confindustria Innovative and Technological Services), one of the largest federations of Confindustria, the Italian industrialists' organization which includes over 120,000 members. The association's main goal is to promote and sustain the economic growth and competitiveness of its industrial sectors in national and international markets. To this end, Assoknowledge represents and safeguards the technical, economic, social and cultural interests of its industrial sectors at the local, national and EU levels. In line with its role as a Confindustria Italian professional association, Assoknowledge's main areas of activity are :

- To represent member interests at the institutional and political level, and to safeguard free market competitiveness
- To support institutions as they develop industrial policies focused on a knowledge-based economy
- To focus on product and process innovation that uses know-how as a tool for market growth
- To foster communication as a strategic tool between suppliers of knowledge and end users
- To promote free market competitiveness within industry

Assoknowledge is the leader of the [Italian Alliance on Nanotechnologies](#).

R&D policies, programs and other initiatives supporting nano

- The [National Research Program \(Programma Nazionale per la Ricerca - PNR\) 2014-2020](#), foresees the investment of 900 M€ until year 2020 for research projects addressing 11 thematic areas aligned with H2020 strategy, including nanotechnology.

Relevant projects

Italy participates in the following ERA-NETs related to nano:

- [SINN ERA-NET](#): promotes the safe and rapid transfer of European research results in nanoscience and nanotechnology (N&N) into industrial applications.

Some examples of key collaborative projects at EU level are listed below:

- [NanoDiode \(FP7\)](#): a project focusing on educational activities specialising in the knowledge transfer of relevant nanotech information on several educational levels. AIRI is one of the project partners.
- [NANoREG \(FP7\)](#): the IIT, ENEA, Istituto Superiore di Sanità, CNR are the Italian project partners. A key focus in this project is given on the initiating of value chain projects, integrating Italian institutions.
- [NANO futures \(FP7\)](#), coordinated by the Italian Company D'Appolonia SpA. The project released an integrated research and innovation roadmap for 2013-2025, including detailed implementation plan focusing more on actions up to 2020.
- [VALUE4NANO \(FP7\)](#), coordinated by the Italian Company D'Appolonia SpA. The project focuses the roadmapping activity on 4 strategic value chains and related classes of nano-enabled products.

Main RTD players and infrastructures in the country/region

- [NEST \(National Enterprise for Nanoscience and Nanotechnology\)](#) is the most important research centre. It is closely associated with INFN and shares facilities. Its research areas are nanophysics and nanoelectronics, nanobio and spintronics.
- [National Nanotechnology Lab - NNL](#) has a multidisciplinary approach at all levels: fundamental research, fabrication, technology transfer and enhancing international profile.
- [TASC Laboratory](#) deals with nanomaterials with emphasis on semiconductor fabrication and analysis.
- [CIVEN \(Nanofabrication Facility\)](#) works on many areas such as sensors, tribology, coatings, composites and bioarrays.
- [ELETTRA](#): synchrotron facility which has a Laboratory for Interdisciplinary Lithography (LILIT), that is dedicated to the development and micro- and nanofabrication of micro-nanosystems. www.elettra.trieste.it

Platforms, networks or clusters

- [VenetoNanoTech](#), the Italian Cluster for Nanotechnologies, was built in 2002 in Veneto by the Veneto Region, the Italian Ministry for University and Research (MiUR), the Venetian Universities, local administrations and other public and private institutions. This was due to the presence in this area of very strong scientific and research competences orientated towards industrial applications along with a high concentration of enterprises mostly interested in nanotechnologies.
- [AIRI/Nanotec IT](#): monitor and assess developments in R&I and policies on KETs and national and international level, including development of technology scenario, assessment of priority industrial technologies, survey on stakeholders' attitudes and

opinions on R&I, monitoring of regulation, standards and ethical evaluation procedures on R&I.

- **Etna Valley – Region of Sicily**: the technological cluster “Micro and Nanosystems” aims at developing research, innovation and entrepreneurship capacities referring to the following areas: optoelectronics, bioelectronics, biosensoristics and bioinformatics; molecular and organic photonics; power electronics on composite materials; nanostructured material and devices; microsystems for the integration on silicon and its complex-function compounds, and applications in ICT sector.

Regions specialized in nano

Veneto, Piedmont, Sicily and Lazio.

2.2.13 Latvia

LATVIA



Local/national contact point

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Contact point profile

The Association FOTONIKA-LV at the University of Latvia was created to take a challenge to lead the photonics sector in the country and has a clear vision of its mission to nurture and develop sustained and growing research activities in photonics domain for Latvia and European Research Area.

FOTONIKA-LV combines the intellectual capacity of three strong research institutes at the University of Latvia: the Institute of Atomic Physics and Spectroscopy (ASI-LU), the Institute of Astronomy (AI-LU), and the Institute of Geodesy and Geodynamics (IGG-LU). FOTONIKA-LV has currently brought together multidisciplinary R&D task force – up to 100 well trained people including: 4 Professors, 28 experienced scientists (Dr), 7 specially trained technicians in the areas of electronics, optics and materials, and 34 doctoral candidates and MSc level students.

The foundation of this association was specifically highlighted as a positive development in Latvian research system on January 2014 in the peer review report of international evaluators of science in Latvia led by the TECHNOPOLIS. FOTONIKA-LVA has achieved financing (3,8M€, 2012-2015) for its projects in the highly competitive (success rate 7%) FP7-REGPOT-2011-1. In the overall process of consolidation of research capacity, one more institute of the University of Latvia, the Institute of Chemical Physics, also having excellent record and history in quantum sciences and nanotechnology research, is joining FOTONIKA-LV.

Also, the association is coordinating the formation of cluster and boosting the development of Latvian national smart specialization strategy in the domain Photonics, Quantum Sciences, Space Sciences and Related Technologies, eventually having regional pan-Baltic influence.

R&D policies, programs and other initiatives supporting nano

R&D policies and programs

There are minor institutional national financing, and RTD programs related to nano are in rudimentary stage. Main, but not systematic inputs come from successful FP7 projects and evidently will be continued via HORIZON 2020.

Specific regulations on nano

There are not specific regulations on nano in Latvia.

Specific skill&education programs

There are not specifically targeted education programs in Latvia, but case by case efforts on BSc, MSc and PhD thesis level.

Relevant projects

Latvia participates in the following ERA-NETs related to nano:

- [EuroNanoMed and EuroNanoMed II](#) (2012-2016). ERA-NET programs in nanomedicine where Latvia participates.

Latvian actors participates in several FP7 projects in nano:

- [SiAM](#): Silicon at the Atomic and Molecular scale (2013-2016). FP7-ICT project in which University of Latvia participates.
- [BIOSENSORS-AGRICULT](#): Development of nanotechnology based biosensors for agriculture (2012-2016). FP7-PEOPLE project coordinated by the University of Latvia.
- [Bio2MaN4MRI](#): Biomimetic and Biomineralized Magnetic Nanoparticles for Magnetic Resonance (2011-2014). FP7-NMP project in which University of Latvia participates.
- [CACOMEL](#): Nano-carbon based components and materials for high frequency electronics (2010-2014). FP7-PEOPLE project in which University of Latvia participates.
- [NASA-OTM](#): NANOstructured Surface Activated ultra-thin Oxygen Transport Membrana (2009-2011). FP7-NMP project in which University of Latvia participates.
- [DeCNaHED](#): Development of Composite Nanomaterials for Hydrogen Energy Devices (2008-2012). FP7-PEOPLE project coordinated by the University of Latvia.

Main RTD players and infrastructures in the country/region

There are no remarkable EU size research infrastructures for nanotechnology research. Main research centres in nano are listed below:

- [Institute of Solid State Physics](#), University of Latvia
- [Institute of Chemical Physics](#), University of Latvia
- [Institute of Physics](#), University of Latvia
- [Institute of Polymer Mechanics](#), University of Latvia
- [Institute of Inorganic Chemistry](#), Riga Technical University
- [Institute of Atomic Physics and Spectroscopy](#), University of Latvia

Platforms, networks or clusters

There is an initiative going on to form the cluster: Photonics, quantum sciences, space sciences and related technologies.

Regions specialized in nano

No strongly defined RIS3 strategy towards nano.

2.2.14 The Netherlands

THE NETHERLANDS



Local/national contact point

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TNO

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Contact point profile

There are several departments at TNO which are related to nanotechnology. The main focus at TNO is to develop nanosystems and nanoinstruments for industrial applications. The role of TNO is to further develop fundamental knowledge from universities, increasing the TRL to an acceptable level by industry to further industrialize it with industrial partners.

R&D policies, programs and other initiatives supporting nano

The nanotechnology policy of the Netherlands consists of three strands that are all being implemented:

- **Opportunities:** Research agenda and Top Sector policy: in 2011, a new national research programme on nanotechnology was started: NanoNextNL which is based on the Strategic Research Agenda that was asked for by the government in both the cabinet and the action plan. Risks and Technology Assessment form part of this research programme. Since 2011, the research agenda for nanotechnology is also part of the top sector policy of the Netherlands, which aims at enhancing the knowledge economy by stimulating nine top sectors (leading economic sectors).

As a new enabling technology, nanotechnology can give a new impetus to innovation within the High Tech Systems and Materials (HTSM) sector and other top sectors, and in the future can also drive technological breakthroughs and solutions to social issues such as the ageing population, climate change, food for a growing population and clean water

- **Safety and risk policy:** To enable all stakeholders in the Netherlands to assume responsibility and co-operate if necessary, the sharing of data, points of view and best-practices are part of the national policy.
- **Societal dialogue and ethical aspects:** this strand was implemented via the Committee on the Societal Dialogue on nanotechnology that organised a Public Engagement process in 2010-2011. Its main conclusion was that citizens from the

Netherlands want a responsible continuation with nanotechnology, just as the government.

R&D policies and programs

- Semiconductor equipments program
- Fast and flexible large area nanoelectronics and nanophotonics program
- Nanoinstrumentations
- Nano-opto-mechanical systems

Specific skill&education programs

The Early Research program 3D nanomanufacturing has been granted, duration 4 years, program leader: Hamed Sadeghian.

Relevant projects

- Parallel scanning probe microscopy
- [The Advanced Research Center for Nanolithography \(ARCNL\)](#) focuses on the fundamental physics involved in current and future key technologies in nanolithography, primarily for the semiconductor industry.
- 3D-Nanometrology

Main RTD players and infrastructures in the country/region

- [NanoLabNL](#) is a Dutch national facility for nanotechnology research. Since 2004 they have been offering the use of their facilities and expertise to universities, research institutes, start-ups and industry on 4 locations in the Netherlands (Delft, Eindhoven, Groningen and Twente).

Platforms, networks or clusters

- [NanoNext NL](#) NanoNextNL is a consortium of more than one hundred companies, universities, knowledge institutes and university medical centres, which is aimed at research into micro and nanotechnology. The total sum involved for NanoNextNL is 250 million euros, half of which is contributed by the collaboration of more than one hundred businesses, universities, knowledge institutes and university medical centres and the other half by the Government of the Netherlands.
- [MinacNed](#) is an association aiming to strengthen the Dutch economic activity based on microsystems and nanotechnology in the Netherlands. It has about sixty members, including research institutes, equipment manufacturers, suppliers and users of technological components.

Regions specialized in nano

Delft, Enschede, Eindhoven and Wageningen.

2.2.15 Portugal

PORTUGAL



Local/national contact point

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Contact point profile

Vasco Teixeira is a Professor, Entrepreneur and Researcher in the field of nanotechnology, nanomaterials, surface engineering, smart materials, layered nanocomposite functional thin films and nanostructured surfaces. He is author or co-author of more than 120 international scientific papers (ISI), journal volumes, book chapters, awarded industry projects in national industrial innovation contests. He is Editor-in-chief of Journal of Nano Research since it starts. (Honorary Editor is Nobel Prize Sir Harry Kroto). He participated and led several National and European R&D projects (EU FP6, FP7, FCT, ADI, QREN, POCTEP, COST). He organised and participated in scientific and technical committees of several national and international conferences and advanced courses related to Nanotechnology, Nanomaterials, Thin Coatings, Technology Transfer and Entrepreneurship. Concerning SME Innovation promotion he was the scientific mentor for high-tech based spin-off's proposals and founder of 2 technological SMEs (Energy & Environment, Nanomaterials & protective coatings and Nanomedicine). He had promoted entrepreneurial culture at academia, innovation and development of new technologies (nanomaterials and nanotechnology) and has supported university spin-offs projects (2 national innovation awards). Janus Award issued by Institute of Advanced Studies (IEA-USP, Brasil).

R&D policies, programs and other initiatives supporting nano

R&D Programs and Funding

- [The Foundation for Science and Technology \(FCT\)](#) is the national funding agency for science, technology and innovation, in all scientific domains, under responsibility of the Ministry for Education and Science. FCT supports the scientific community in Portugal through a range of funding schemes, tailored for individual scientists, research teams or R&D centres. There are special calls concerning nanotechnology topics, although some projects are funded in areas like Materials Engineering, Physics, Chemistry or Biology where the emphasis is nano.
- [Innovation Agency \(AdI\)](#) is essentially dedicated to the promotion of innovation and technological development with a view to facilitating closer ties between research

activities and the Portuguese business sector. Recently, the Portuguese government has decided to strategically reposition the AdI, reformulate its mission and responsibilities, and change its name to [National Innovation Agency \(NIA\)](#).

- **UT Austin-Portugal Program (CoLab Emerging Technologies program).** Nanotechnology and nanoscience have joined recently the academic areas supported by the UT Austin-Portugal Program, whose main idea is to advance a collaborative vision in nanotechnology research, education and training, as well as to explore common interests in technology commercialization.
- [MIT Portugal Program](#) is an international collaboration seeking to demonstrate that an investment in science, technology and higher education can have a positive, lasting impact on the economy by addressing key societal issues through quality education and research in the emerging field of engineering systems.
- **NanoTRAINforGrowth Program** is a post-doctoral fellowship program launched by the International Iberian Nanotechnology Laboratory (INL) which allows experienced researchers (from all over the world and of all nationalities) to sketch out a research project and work on their own research idea at INL's facilities.
- **Portugal Ventures** is a special institution supporting entrepreneurship by funding project ideas to start spin-offs.

Specific skill&education programs

There are several Masters and PhD programmes related to nano available in different Universities at Portugal.

- Masters: in Micro/Nanotechnologies/ in Physics of Advanced Materials/in Biophysics and Bionanosystems (University of Minho)
- Master in Nanochemistry and Nanomaterials (University of Madeira)
- Master in Micro/Nanotechnologies (New University of Lisbon)
- Phd Programme in Nanoscience and Nanotechnology (New University of Lisbon)
- PhD in Nanosciences and Nanotechnology (University of Aveiro)
- Doctoral program in Materials Engineering (University of Minho)
- Doctoral program on Advanced Integrated Microsystems (INESC MN)
- BIO-E – Doctoral Program in Bioengineering (MIT-Portugal)

Other initiatives supporting nano

The Portuguese Government initiated in 2007 several international partnerships grouping portuguese universities and world-class research institutions. In addition, an ambitious cooperation program in nanotechnologies was launched with Spain. As a consequence of these actions were created:

- The International Iberian Nanotechnology Laboratory in Braga.
- The MIT (Massachussets Institute of Technology)-Portugal Program.
- The CMU (Carnegie-Mellon University)-Portugal Program.
- The University of Texas at Austin-Portugal Program.
- A Fraunhofer Institute in Portugal (Porto).

Relevant projects

National level:

- [NANO@CONSTRUÇÃO](#): Nanotechnology applied to the service of the Energy Efficiency and Energy Requirements in the Construction Sector, led by Centi.

Collaborative projects at EU level:

- [POLARIS](#): Nanomedicine field to strengthen the competitive position at the European level (FP7 – REGPOT).
- [INNOSHAD](#): Innovative Switchable Shading Appliances based on Nanomaterials and Hybrid Electrochromic Device Configurations, led by University of Minho (FP7).
- [EcoPlast](#): Research in new biomass-based composites from renewable resources with improved properties for vehicle parts moulding (FP7).
- [FIND & BIND](#): Mastering sweet cell-instructive biosystems by copycat nano-interaction of cells with natural surfaces for biotechnological application, led by 3Bs Research Group (FP7).
- [NANOFOL](#): Folate-based nanodevices for integrated diagnosis/therapy targeting chronic inflammatory diseases (FP7).
- [ECOPLAST](#): Research in new biomass-based composites from renewable resources with improved properties for vehicle parts moulding, led by University of Minho (FP7).
- [CONTACT](#): Marie Curie Initial Training Network for the tailored supply-chain development of the mechanical and electrical properties of CNT-filled composites, led by University of Minho (FP7).
- ULTRASMMOOTH (2004-2008), SPINSWITCH (2006-2010), SPINICUR (2012-2015) and PROSENSE (2012-2015). International network for Nanoscience (SUDOE-TRAIN2), focused to improve the shared use of the skills and the resources on nanotechnologies and the implementation of Master and PhD programs within SUDOE region, led by INESC-MN).

Main RTD players and infrastructures in the country/region

The main nanotech topics under research at Portuguese institutions are: nano & microelectronics and related nanomaterials, nanomaterials for non-electronic applications, nanomedicine and nanobiotechnology, nanomanipulation and nanofabrication, nanocharacterisation and nanotechnology risks.

Most representative institutions are listed below:

- [International Iberian Nanotechnology Laboratory \(INL\)](#)
- [Centre for Nanotechnology and Smart Materials \(CENTI\)](#)
- [Institute of Nanoscience and Nanotechnology \(IN\)](#)
- [Institute of Nanoscience and Nanotechnology – Associated Laboratory \(INESC-MN/IN\)](#)
- [3B's Research Group \(Biomaterials, Biodegradables and Biomimetics\)](#)
- [ICVS/3B's Associate Laboratory \(AL\)](#)
- [Center of Physics of the University of Minho \(CFUM\)](#)

- [Institute of Nanostructures, Nanomodelling and Nanofabrication \(I3N\)](#)
- [Institute for Polymers and Composites \(IPC\)](#)
- [Institute of System and Computer Engineering of Porto \(INESC Porto\)](#)
- [Centre of Biological Engineering \(CEB/IBB\)](#)
- [Nanotechnology Research Division \(NRD\) of the University of Aveiro](#)
- [Chemistry Centre of the University of Minho](#)
- [ALGORITMI Centre](#)
- [Research Institute for Medicines and Pharmaceutical Sciences \(iMed.UL\)](#)
- [CENIMAT/I3N](#)
- [Centre for Mechanical Engineering of the University of Coimbra \(CEMUC\)](#)
- [Institute of Materials and Surfaces Science and Engineering \(ICEMS\)](#)
- [Centre for Research in Ceramics & Composite Materials \(CICECO\)](#)
- [Centre for Molecular Chemistry-Physics \(CQFM\)](#)
- [Ceramics and Glass Technology Centre \(CTCV\)](#)

Platforms, networks or clusters

- [Nanovalor – Nanotech Industry Cluster](#)
- [Invisible Network \(IN\)](#)
- [Pole for Information and Communication Technologies \(TICE.PT\)](#)

Regions specialized in nano

Main areas specialized in nano are: North of Portugal (Porto, Braga and Guimarães), Coimbra and Lisbon.

According to the eye@RIS3 tool from the S3 platform, Portugal regions include under the EU priorities **1. KETs and 2.** the following:

Norte (capital: Porto):

- KETs

Centro (capital: Coimbra):

- Manufacturing&Industry (2. Advanced materials)

2.2.16 Romania

ROMANIA



Local/national contact point

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Contact point profile

The general objective of IMNR is to become a leader institute in the field of science and technology of non-ferrous metal based materials and to fully integrate in the European Research Area.

IMNR activities related to nanomaterials field are the following:

- Wet chemical synthesis of nanocrystalline ceramic powders (co-precipitation, sol-gel colloidal from inorganic precursors, hydrothermal);
- Chemical synthesis and functionalisation of new hybrid inorganic-organic nanomaterials;
- Hydrothermal/electro-depositing processes for thin nanocrystalline ceramic films;
- Synthesis of ceramic matrix composite nanomaterials;
- Synthesis of core/shell nanostructured powders;
- Processing of ceramic and composite nanopowders;
- Fundamental studies on the mechanisms and kinetics of the synthesis processes.

IMNR participates in several FP7 projects and European initiatives related to nano.

R&D policies, programs and other initiatives supporting nano

R&D programs

- 3rd National Program for Research and Development 2014-2020: Key Enabling Technologies.
- Structural Funds Program for Competitiveness 2014-2020: Research Infrastructure Development.

Specific regulations on nano

- Romanian Group membership in ISO TC 229 Nanotechnologies.

Specific skill&education programs:

- Master programs at main technical universities.
- Structural Funds Program 2014-2020 for Human Resources Development: post-doc courses and specialization of industrial engineers.

Relevant projects

The most relevant projects related with nanotechnology are listed below:

- [NANOPROSPECT](#): Nanotechnologies in Romania: a prospective study.
- [NANOCOM](#): Reconfigurable Microsystem Based on Wide Band Gap Materials, Miniaturized and Nanostructured RF-MEMS – NANOCOM. JU ENIAC project in which National Research & Development Institute for Microtechnology (IMT) participates.
- [Natural nanoparticles in soils as possible environmental vectors for contaminants](#). Bilateral Germany-Romania project in which Bucarest Polytechnic University participates.
- [Investigations on alloyed intermetallic compounds NiAl, Ni3Al and NiTi by means of neutron diffraction technique](#). ANCS project in which Institutul National de Cercetare Dezvoltare pentru Inginerie Electrica (ICPE-CA) participates.
- [FILOWEPS](#): Thin Film of Nanoporous Silica Zeolite Crystals on Ceramics for Low-Dielectric Constant Materials. Collaborative project with South Korea in which Technical University Gheorghe Asachi of Iasi participates.
- [Development and application of high-tech materials based on innovative polymers](#). Collaborative project with Germany in which "Petru Poni" Institute of Macromolecular Chemistry (IASI) participates.
- [MULTINANOWIRES](#): Multifunctional zinc oxide-based nanostructures – from materials to a new generation of devices.
- [New nanostructured semiconductor materials type I-III-VI2. Preparation and characterization](#).
- [NANOTEX](#): Development of Nanostructured Functionalized Textiles.
- [SUPERSONIC](#): Supersonic deposition of nanostructured surfaces.
- [NANOMAGMA](#): Nanostructured active magneto-plasmonic materials. FP7 project in which International Centre of Biodynamics participates.
- [NANOSENSE](#): Novel magnetic nano-structures for sensor fabrication.
- [NANOPHOB](#): Dope TiO₂ based nanoparticles as elements of photo-voltaic cells or bactericide elements.
- [ImPart](#): Improving the understanding of the impact of nanoparticles on human health and the environment. FP6 project in which Institutul de Chimie Fizica participates.
- [Hybrid systems formed by polymers and magnetic nanoparticles](#).

Main RTD players and infrastructures in the country/region

The most relevant infrastructures in Romania are listed below:

- [MIMOMENS](#): European Centre of Excellence in Microwave, Millimetre Wave and Optical Devices, based on Micro-Electro-Mechanical Systems for Advanced

Communication Systems and Sensors.

- [CNT-IMT](#): Centre of Nanotechnologies (under the aegis of Romanian Academy).
- [CENASIC](#): Research Centre for Nanotechnologies and Carbon-based Nanomaterials.
- [BIODYN](#): International Centre of Biodynamics.
- **HighPTMET**: Study and Research Centre for Intensification of Metallurgical Processes at High Pressures and Temperatures.
- **RITecC**: Research and Innovation Centre for New Materials (launched in September 2014).
- [ELI-NP](#): EU - Extreme Light Infrastructure ELI Magurele (to be built).
- Centre 3NM from Bucharest Polytechnic University.

Platforms, networks or clusters

- [Magurele High Tech Cluster](#): cross sectorial cluster developing applications of nuclear physics, lasers and related areas, and promoting competitiveness of these research topics.

Regions specialized in nano

Bucharest-Ilfov Region

Other information

Major Information regarding KETs and nano activities in Romania may be found [in this link](#).

2.2.17 Spain

SPAIN



Local/national contact point

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Contact point profile

PRODINTEC is a technology centre specialized in industrial design and advanced manufacturing. Our mission is to foster the competitiveness of industrial firms by applying technological advances both to their products and to their manufacturing and management processes.

PRODINTEC belongs to the Steering Committee of *NANO* futures and chairs the Networking Working Group. Among other activities, is taking care of translating *NANO* futures European approach (and its related projects and actions) to the Spanish Authorities and nano community and vice versa.

R&D policies, programs and other initiatives supporting nano

Nanotechnology was considered to be a Strategic Action of the Spanish National Plan for Scientific Research, Development and Technological Innovation 2008-2011, extended to 2012. Within the new [Spanish State Plan for Scientific and Technical Research and Innovation 2013-2016](#), different funding support instruments will be available for the Key Enabling Technologies, where nanotechnology is included. The KETs considered, in alignment with those defined in the European Horizon 2020 Programme are: photonics, micro and nano-electronics, advanced materials, biotechnology, advanced manufacturing, ICT and nanotechnologies.

Moreover, nanomedicine development is included in the aforementioned State Plan, specifically within the challenge “Health. Demographic changes and well-being”. In there, nanotechnology is considered a priority topic as a tool for diagnosis processes and human diseases treatments.

Annually a work R&D&I program is prepared, which acts as a tool for short-term scheduling of science and technology policy, as well as an instrument for coordination of the actions. This program mainly includes information about the schedule of public calls, the economic distribution of the annual budget and priority program areas.

The main instrumental funding tools used for this are:

- **R&D&I projects:** To be executed by one or several companies (individual or collaborative projects). The projects may consider the involvement of public R&D for the

implementation of specific aspects within of the objectives. These projects are aimed at the KETs development and dissemination including those projects that are close to market.

- **Innovation and technology modernization projects:** to increase technological absorption capacity of firms, especially SMEs, by active adaptation and assimilation of knowledge as well as its modernization by incorporating technology in mature sectors.

Skills and Education strategy for nanotechnology is embedded in the Spanish Strategy for Science, Technology and Innovation 2013-2020. One of its main priorities is the "promotion of the generation of knowledge and talent". Its main aim is to push the education and training of human resources to perform R&D&I activities, one of the concerns being to guarantee the PhD and researchers good access to the world of research and to find a job.

Relevant projects

Spain participates in the following ERA-NETs related to nano:

- **SINN ERA-NET:** promotes the safe and rapid transfer of European research results in nanoscience and nanotechnology (N&N) into industrial applications
- **FLAG-ERA:** the goal of supporting the Future and Emerging Technologies (FET) Flagship concept and more specifically, the FET Flagship initiatives Graphene and Human Brain Project (HBP).

Some example of relevant projects at national level are shown below:

- **NANOSOST** (CENIT, 2008-2010): Development of metrology equipment for the characterization of nano-particles in nano-manufacturing processes for health and safety considerations
- **INFINITEX** (CENIT, 2009-2013) which has the aim of creating and enhancing a national value chain that works on high added-value functionalized textiles incorporating nanomaterials.
- **ATON** (CENIT, 2010-2014): Research and development in novel materials and processes for thin film solar technology.
- **FENIX** (PEIT, 2007-2011): Strategic research into safer and more sustainable roads.

Some example of collaborative projects at international level in which Spanish partners are involved are listed below:

- **GRAFOL** (FP7): European project aiming at roll-to-roll production of graphene films on silicon wafers
- **NANOREG** (FP7): A common European approach to the regulatory testing of nanomaterials
- **MEEFS** (FP7, coordinated by Acciona Infraestructuras): Multifunctional Energy Efficient Façade System for Building Retrofitting.
- **LIGHT-ROLLS** (FP7, 2009-2012, coordinated by PRODINTEC): The project focuses research and development of modular based production units for the high throughput manufacture of micro-structured, polymer based components and microsystems. The scientific objective aims to realize structures in the micron range and integrate also dies to be assembled in high-speed and parallel by benefit of self assembling. Nanoparticle dispersions used in fast conductive track printing technologies will allow the parallel

generation of conductive lines.

- [ADDNANO](#) (FP7, 2009-2011): Its overall objective is to overcome the technological barriers involved in the development of large scale market introduction of a new generation of lubricants incorporating inorganic fullerenes and other nano- materials.

Main players and infrastructures in the country/region

Main Spanish players, including companies, RTD performers, and others, with relevant skills on nanoscience and nanotechnology are described within the “**Directory of the Spanish Nanotechnology Community**” prepared by NANO*futures*- Spain. The Directory can be found [here](#).

Platforms, networks or clusters

Main platforms and networks are listed below:

National level:

- [The Spanish Nanomedicine Platform](#): is an initiative that aims to bring together the main Spanish players in research, industry and administration, to promote a common strategy in this highly multidisciplinary area.
- [MANU-KET](#): Spanish Technological Platform for Advanced Manufacturing.
- [Suschem-España](#): Spanish Platform on sustainable chemistry.
- [Fotonica21](#): The Spanish Technology Platform for Photonics.
- [3NEO Platform](#): Spanish Platform to promote the development of printing technology, new materials and new applications.
- [NanoSpain](#): Spanish Nanotechnology Network, promotes the exchange of knowledge between Spanish groups working in different fields related to Nanotechnology and Nanoscience increasing collaboration among universities, research institutions and industry.
- [Iberoamerican Network NANODYE](#): Network's mission and objectives developing dissemination of Nanoscience and Nanotechnology in the Iberoamerican Region, as well as the development of training activities at various educational levels.

Regional level:

- **Group Connect-EU Materials** in Cataluña: aims to contribute to the promotion and internationalisation of R&D and Innovation for all its members.

Regions specialized in nano

According to the eye@RIS3 tool from the S3 platform, Spanish regions include under the EU priorities **1. KETs and 2. micro/nano electronics** the following:

Galicia:

- Boost ICTs as the driving sector of the Galician knowledge-based economy just like in the case of other KETs.

Spanish regions include under priorities **1. KETs and 2. nanotechnology** the following:

Basque Country:

- Nanotechnology.

Spanish regions include under priorities **1. KETs and 2.** the following:

Galicia:

- Diversification of Galician driving sectors and their ancillary sectors by using Key Enabling Technologies (KETs) oriented towards development of new high added value processes and products that enable exploration of new markets based on hybridisation, knowledge and technology. [Diversification of Driving Sectors: Automotive and Shipbuilding] [Diversification of Driving Sectors: Textile] (2. Advanced materials).

Asturias:

- Steel industry - open innovation in steel production and manufacturing, maritime industries, shipbuilding and off-shore energy industries (2. Advanced manufacturing systems).
- New models for manufacturing - digital and additive manufacturing (2. Advanced manufacturing systems).
- Advanced and sustainable materials - Materials for industry, Sustainable materials, Nanomaterials and Graphene (2. Advanced materials).
- Agro-food markets - agrofood resources and dairy biotechnology (2. Industrial biotechnology).

Basque Country:

- Advanced manufacturing (2. Advanced manufacturing systems).
- Biosciences (2. Industrial biotechnology).

La Rioja:

- Automation and advanced Manufacturing (2. Advanced manufacturing systems).

Navarra:

- Mechatronics (2. Advanced manufacturing systems).

Aragon:

- Automotive (2. Advanced manufacturing systems).
- New materials (2. Advanced materials).
- Health and biotechnology (2. Industrial biotechnology).

Madrid:

- Development of instrumentation, microsystems and sensors. Industrial Technologies (includes processes with less environmental impact) and robotics (2. Advanced manufacturing systems).
- Development of new detection methods, genomics, proteomics, metabolomics and bioinformatics (2. Industrial biotechnology).

Comunidad Valenciana:

- Advanced Manufacturing Processes for Capital Goods (2. Advanced manufacturing systems).
- Innovative products habitat: functional products (2. Advanced materials).
- Innovative products: advanced and efficient manufacturing systems and materials (2. Advanced materials).

- Quality of life. Agri-food, cosmetics and household products. Production and processing. (2. Industrial biotechnology).

Castilla La Mancha:

- Biotechnology. Bioeconomy (2. Industrial biotechnology).

Murcia:

- KETs in agrofood cluster and industry (2. Industrial biotechnology).

Canarias:

- Biotechnology (2. Industrial biotechnology).

Other information

In 2008, a book from the Spanish Foundation for Science and Technology called "[Teaching Unit for Nanoscience and Nanotechnology](#)" was published. It was considered that Nanotechnology enables the approach to science and is an opportunity that science teachers should not miss. This learning unit was distributed to all educational centers in the country.

2.2.18 Sweden

SWEDEN



Local/national contact point

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Contact point profile

SwedNanoTech is Sweden's umbrella organization for the Swedish nanotechnology actors. The association was formed in 2010 to profile Sweden as a prominent nanotechnology country in research and products, but also as a land of investment opportunities. SwedNanoTech wants to gather Swedish nanotechnology actors to jointly shape the landscape of Swedish nanotechnology. The purpose is to influence, create meeting places and to build bridges between academia, industry, business and the public.

R&D policies, programs and other initiatives supporting nano

Initiatives supporting nano

- A science and innovation agenda, "Nanotechnology for a sustainable society", was produced by SwedNanoTech in 2013.
- An action plan for safe handling of nanomaterials was proposed to the government by a special investigator; SwedNanoTech was active in the investigator's reference group.

Specific skill&education programs

- Lund University is the only university in Sweden with a five-year curriculum for a Master degree in nanotechnology.

Relevant projects

The most relevant projects of the most important stakeholders in nanotechnology in Sweden are listed below:

- [Chalmers University of Technology](#): area of advance nanoscience and nanotechnology, coordination of FET Graphene Flagship.
- [Lund University](#): member of Nanometer Consortium.
- [Uppsala University](#): Ångström Laboratory.

- [Karolinska Institute](#): Nano-toxicology expertise coordinates several nanosafety projects within FP7.
- [Linköping University](#): Materials science, micro- and nanoelectronics, sensors. Excellence center in functional materials.
- [KTH Royal Institute of Technology](#), [Innventia](#) and [Stockholm University](#): world leading knowledge in nanocellulose and safety.

Main RTD players and infrastructures in the country/region

- [Myfab](#): Swedish national research infrastructure for micro and nano fabrication.
- [MAX IV – Laboratory](#): established July 1, 2010 as a national research infrastructure hosted by Lund University through an agreement between the Swedish Research Council, VINNOVA, Lund University, and Region Skåne.
- [European Spallation Source](#): to be inaugurated in 2019.
- [Acreo](#): Swedish ICT Research Institute.
- [SP Technical Research Institute of Sweden](#): leading international research institute.
- [Karolinska Institute](#)
- [Science for Life Laboratory \(SciLifeLab\)](#) is a national center for molecular biosciences with focus on health and environmental research.

Platforms, networks or clusters

- [SwedNanoTech](#): national association for the promotion of nanotechnology.
- [PhotonicSweden](#): aims to be the voice of the Swedish Photonics industry towards the Public, the Government and foreign and European organizations, to formulate national R&D agendas in Photonics for innovation and growth, and to increase the collaboration between photonics industry, academia and institutes.

Regions specialized in nano

Stockholm-Uppsala, Linköping, Malmö-Lund, Gothenburg-Halmstad-Borås and Umeå.

Other information

Nanoscience has been of high priority in the Government's Research Bill since 2008. A newly initiated research project, Mistra Environmental Nanosafety, engages most universities in the country and has an overall budget of more than 500,000 € in 4 years.

All research groups in Sweden are involved in EU projects.

2.2.19 Switzerland

SWITZERLAND



Local/national contact point

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Contact point profile

TEMAS is a service provider involved in various nanorelated projects (industrial consulting and EU research projects).

TEMAS is a private SME in Switzerland, strongly engaged in technology transfer and innovation oriented programmes and projects as well as open innovation consulting. Target groups are SMEs and larger industries, as well as research teams, public authorities, promotion agencies, business associations and interest groups.

On an international level, TEMAS has been a member of the Steering Committee and of all working groups within the MNT ERA-NET. TEMAS is WP leader (Liaisons) of the ongoing FP7 project SIINN (Safe Implementation of Innovative Nanoscience and Nanotechnology). TEMAS is partner of the ongoing FP7 project NANoREG (WP leader "Liaisons, Dissemination, Exploitation and Communication") and acts as the Swiss national coordinator for this project.

On a national level, TEMAS has developed the concept for the Swiss nano related funding programme TOP NANO 21 of the ETH board. Subsequently, TEMAS has managed the implementation and financials of this programme. Currently, TEMAS has been developing the concept of the "Precautionary Matrix for Synthetic Nanomaterials" as a tool for SMEs and industries for the safe implementation of nanotechnologies, in the frame of the Swiss Action Plan "Synthetic Nanomaterials".

R&D policies, programs and other initiatives supporting nano

R&D programs

- [National Research Program "Opportunities and Risks of Nanomaterials"](#) (NRP 64): with an overall funding of almost 10M€, it hopes to be able to bridge the gaps in our current knowledge on nanomaterials.
- [Commission for Technology and Innovation \(CTI\) program](#): CTI lends support to R&D projects, to entrepreneurship as well as to the development of start-up companies. CTI helps to optimise knowledge and technology transfer through the use of national

thematic networks.

- [Nano-Tera.ch](#): cooperation project that supports the development of complex multiscale systems for future applications in the fields of health, security, energy and the environment.

Relevant projects

At national level, several projects have been started within the NRP 64 program. Further information and details about the projects can be found [here](#).

Main RTD players and infrastructures in the country/region

An overview of institutes and infrastructures related to nano is available [here](#). Most relevant are listed below:

- [ETH Zurich Micro and Nano Systems](#):
- [ETH Zurich Nanophysics](#)
- [ETH Zurich Nanotechnology Group](#)
- [ETH Zurich Nanometallurgy](#)
- [ETH Zurich Nano TCAD Group](#)
- [IBM Nanocenter](#)
- [Center of Micronanotechnology \(CMI\)](#)

Platforms, networks or clusters

- [Micro-nanotech cluster of Western Switzerland \(MiCRONARC\)](#)
- [Nano-Cluster Bodensee](#)
- [i-net](#): public private partnership between the cantons of Aargau, Baselland, Basel-Stadt, Jura and leading companies from the region. It supports companies in the technology fields of ICT, Life Sciences, Medtech, Cleantech and Nanotechnology.
- [InfoNano](#): the central federal information platform for nanotechnology.
- [SwissNanoCube](#): platform for nanotechnology knowledge and innovation.
- [NanoValley Trinationl European Technology Region](#) involves entities from Germany, France and Switzerland. It is a high-tech initiative to support innovative activities in SMEs. Its major goal is the transfer of research results into products and new businesses.

Regions specialized in nano

Not applicable in Switzerland, but an overview of nanorelated activities in the regions can be found [here](#).

2.2.20 Turkey

TURKEY



Local/national contact point

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Contact point profile

Dr. Volkan Ozguz has been working in the semiconductor technology, packaging, microelectronics manufacturing and nanotechnology fields since 1979. He has extensive R&D and project management experience in the design and implementation of microelectronic, nanoelectronic and optoelectronic systems including fabrication technologies, process design and integration, facility operations and technology transfer.

The Sabancı University Nanotechnology Research and Application Center (SUNUM), is developed with approximately 25M€ provided by State Planning Organization and Sabancı Foundation. SUNUM has been operational since 2012. The Center provides valuable additional capabilities to the existing research infrastructure of the Faculty of Engineering and Natural Sciences of Sabancı University. The high-tech facility of the Center is designed to support cutting-edge scientific and technological research related to nanotechnologies. SUNUM laboratories are hubs for focused experimental capabilities to enhance nanotechnology research spanning wide application areas. Combined synergistically with the research expertise of the Faculty of Engineering and Natural Sciences, SUNUM allows application oriented, multidisciplinary research programs, bringing together researchers to address applications in electronics, healthcare, structural materials, energy, environment, agriculture, food and defense industries. SUNUM is becoming a key hub and a leading example for the implementation of “open innovation” and “innovation campus” concepts in Turkey by establishing precompetitive research consortiums and strategic research alliances with academic and industrial partners. SUNUM promotes the translational research for the establishment of “start-up” and “spin-off” companies and the protection of intellectual property rights by patents.

R&D policies, programs and other initiatives supporting nano

Turkey has been investing heavily in the last years in the nanotechnology area. Public funds allocated to R&D increased more than 500% in 6 years. The government initiated many subsidies to promote R&D and allocated funds for large scale infrastructure investment. The foundation is the “Vision 2023 Strategy Document”, identifying nanotechnology as a strategic investment area for the technical advancement of the country. In the document nanotechnology is identified as one of the strategic technological fields with strategic focus areas;

nanophotonics, nanoelectronics, nanomagnetism, nanomaterials, nanocharacterisation, nanofabrication, nanosised quantum information processing and nanobiotechnology. In this regard, nanotechnology research centres, focusing on these areas are established. As a result, Turkey is in the top 3 in the world for the rate of increase of scientific publications in nanotechnology field.

As well as national science and technology strategies, the importance of nanotechnology is also stated in other policies of the country. For instance, nanotechnology is identified as a priority field in the Ninth Development Plan (2007-2013) of Turkey, which was prepared in line with international developments and basic trends for the 2007-2013 period and considered past developments in the Turkish economy. Nanotechnology is also mentioned in the Turkish Industrial Strategy Document 2011-2014 (Towards EU Membership).

Relevant projects

R&D projects in nanotechnology are performed mainly by 3 centers:

- [National Nanotechnology Research Center - Institute of Materials Science and Nanotechnology \(UNAM\)](#): Since its establishment in 2006, UNAM has completed 47 projects whose total funding was over 25 M€. As of August 2014, there are over 50 active projects running at UNAM with a total budget of around 18 M€. UNAM also hosts 3 ERC awardees out of 6 ERC awardees in total in Turkey. Through all these projects, UNAM has established a world-class infrastructure and trained over 300 highly qualified experts. There are over 800 external users of UNAM.
- [Sabanci University Nanotechnology Research and Application Center \(SUNUM\)](#): since its establishment in 2012, the active research project volume at SUNUM reached 52 projects totaling 7 M€, including 1.6 M€ in commercial projects. SUNUM is the only Turkish institution participating to the Graphene-CA and Human Brain Program FET-Flagship projects. There are over 300 users at SUNUM.
- [Selçuk University Advanced Technology Research and Application Center \(ILTEK\)](#): since its establishment in 2009, ILTEK has completed national and international projects with total funding over 9 M€. ILTEK has been involved 4 FP7 projects. From these projects, ILTEK established good collaboration with world-class research groups to carry out research in the area of nanotechnology, advanced materials, and biotechnology.

Main RTD players and infrastructures in the country/region

For the period 2003-2014, 19 new nanotechnology Research Centers were founded in Turkey with a funding total of 190 M€. More than 1,200 full time researchers and 100 SME and large companies contribute to the growth in the nanotechnology area. Few examples of large scale, integrating centers are [UNAM](#), [SUNUM](#) and [ILTEK](#).

Platforms, networks or clusters

The main event for networking opportunities in the area of Nanoscience and Nanotechnology in Turkey is the [NanoTR Conference](#) held on annual basis. The conferences started in 2005 by Bilkent University and became an international event attracting more than 1,000 researchers from a variety of nanotechnology related fields.

Another networking activity is the voluntary “National Nanotechnology Initiative – Ulusal Nanoteknoloji Girişimi UNG”, aimed at promoting the use of nanotechnologies in industrial sectors in Turkey and establishing implementation strategies from industrial aspects.

Regions specialized in nano

The main areas for nanotechnology research and development are Istanbul and Ankara regions, although there are a few other laboratories distributed across the country.

Activities in the field of nanoscience and nanotechnology contribute to the application areas such as structural materials, nano-composites, advanced packaging materials, biotechnology and defense.

2.2.21 UK

UK

**Local/national contact point**

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Mark Morrison has been engaged in nanotechnology analysis for the past ten years, coordinating and participating in over 20 EU-funded projects, both supporting policymakers and delivering new RTD. He has experience in regulations and standards and has delivered several projects on societal aspects and public engagement.

Currently CEO of the Institute of Nanotechnology (IoN), a registered charity established to inform and educate the wider community on developments in nanotechnology. It works with industry, academia, government and NGOs to achieve this, and is highly active in European initiatives, in addition to its own activities in education and business support.

Founded in January 1997, it grew out of the Centre for Nanotechnology, part funded by the DTI through the UK's National Initiative on Nanotechnology (NION). The Institute was one of the world's first nanotechnology information providers and is now a global leader.

R&D policies, programs and other initiatives supporting nano

The UK government invested in specific nanotechnology programs between around 2002 and 2010. Since that time however, it perceives nanotechnology as more of an enabling or general purpose technology that supports advanced industrialisation and as such no longer funds nano-specific programs. Instead it is included in many programs through the UK Research Councils (EPSRC, BBSRC, STFC, NERC, ESRC and MRC); with each council funding aspects of nanotechnologies and nanosciences relevant to their goals.

[Innovate UK](#) (formerly known as the Technology Strategy Board or TSB), is funded through the Department for Business, Innovation & Skills (BIS) to provide commercialisation activities that include nanotechnologies. Innovate UK runs a large online network of over 100,000 members, who have the opportunity to join different special interest groups, several of which have nanotechnology themes.

Relevant projects

As stated above there are no longer nano-specific programs in the UK. In the past, UK

Research Councils (RCUK) funded grand challenges based on nanotechnology to tackle issues of energy and health.

Main RTD players and infrastructures in the country/region

The UK government funded over 50 micro and nanotechnology centres during the period 2003-2007, many of which are still in operation. Since 2011 the focus has been more on technology and innovation centres known as '[Catapults](#)' which address specific themes, such as high value manufacturing and offshore renewable energy. These are loosely modeled on the German Fraunhofer system. Although none are dedicated to nanotechnology per se, a number, such as the [High Value Manufacturing \(HVM\) catapult](#), employ nanotechnology in their services.

Platforms, networks or clusters

The UK government funded a number of knowledge transfer networks, one of which was dedicated to nanotechnology. In April 2014 these were merged into a new company 'KTN' and ongoing nano-themed activities can be accessed [here](#).

Regions specialized in nano

There are nanotechnology activities all across the UK and in every major university, however key areas include London, Cambridge, Oxford, West Midlands, Leeds-Sheffield, and Glasgow-Edinburgh. RTD activities span all sectors, but particularly materials, electronics, energy and health/biotechnology.

3 Summary

As reflected in this document, all the countries or regions that are part of “NANO*utures* lighthouses” have developed initiatives to promote nanotechnology (funding programs, specialised networks, specific skill & education programs...), and also have research centers actively involved in R&D in nano at national and international level.

These initiatives are less established in Eastern Europe and Latin America, so the membership in this network can promote the exchange of good practices and experiences in the dissemination and promotion of nanotechnology.

The Directory will be updated regularly with novel information from existing NANO*utures* lighthouses, as well as information about new ones that will join. The main purpose is to promote networking actions between key players dealing with nanotechnology all over the world in order to be able to complete all the stages of the nano-enabled products value chains.

In the framework of Value4Nano project, it is intended to keep increasing and reinforcing this network so that it becomes more representative. To this end, we are establishing contacts with organizations in countries not yet represented in the network (Argentina, Czech Republic...), in order to include them as NANO*utures* lighthouses.