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Research projects on EHS aspects of nanotechnology in the 7th Framework Program of the EU

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Summary

The funds for research on nanotechnologies (NMP – nanotechnology and nanosciences, new materials and new production processes), a funding priority established in 2002 by the EU Commission, were increased in the current 7th Framework Program. The expenditures for research on the environmental and health impacts of nanoparticles have shown a particularly large jump. Beyond increasing the budget for additional research projects, the funding structure was also improved. The Commission is pursuing two main goals. The first is to create synergies and help avoid redundancies on the national level by more strongly interlinking the scientific institutions. The second is to intensify the information exchange between the respective institutions by establishing international networks and communication platforms. EU institutions such as the Joint Research Centre are also substantially involved in these networks. One such network is the NanoSafety Cluster, which to date has encompassed more than thirty EHS projects (five of them still from the 6th Framework Programme). In the past, the research focus was mostly on the potential health impacts of synthetic nanomaterials; increasingly, efforts are being made to study the potential impacts on the environment and the protection of employees that produce and process nano-components. Finally, the funding of research proposals that deal with the necessary implementation of regulatory approaches (laboratory analytics, detection methodologies, development and adaptation of measuring instruments) was intensified.

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Introduction

The Action Plan[1], presented by the EU Commission in 2004, envisioned integrating "the social dimension into a responsible technology development" and strengthening efforts related to "health, safety, environmental aspects and consumer protection". This encompassed (1) the systematic study of safety-relevant aspects at the earliest possible date, (2) integrating health- and environment-relevant aspects in research and development, (3) conducting targeted studies on toxicology and ecotoxicology and, finally, (4) adapting risk assessment approaches to nano-specific aspects in all phases of product life-cycles. The primary goal was to improve the competitiveness of European industry. The draft presented in mid-2011 for the planned research priorities[2] continues this strategic focus.

The EU Parliament had already discussed the Nano Action Plan developed by the Commission before the start of the current Framework Program. From the onset, the relevant parliamentary resolution[3] called for an improved coordination with the Member States and more risk research, consideration of the precautionary principle and a deepened dialogue with citizens. The EU Parliament clearly felt that the rules require urgent adaptations in order to adequately consider nano-risks: In the resolution of April 2009[4] the parliamentarians underlined the existence of a considerable "lack of information about the use and safety of nanomaterials that are already on the market".

The overall scope of the projects on nanotechnology, materials and production (NMP) funded by the 7th RP is listed at about 3.475 mill. €. According to EU sources, about 102 mill. € were earmarked for safety aspects (nanosafety research).[6]

The 7th EU Framework Research Program (RP) distinguishes between "EHS" (Ecological, Health and Safety Aspects) and "ELSA" (Ethical, Legal and Social Aspects); this is accompanied by the sector "Outreach" (public relations work).[5] The sector "Security" is treated separately.

EHS: Risk assessment and the potential health- and safety-relevant impacts of nanomaterials. The research here focuses primarily on the impacts of synthetic nanomaterials on the human body, in the 7th RP increasingly also on the environment.

ELSA: The focus here is on public acceptance of nanotechnology development under consideration of all the relevant ethical, legal and social aspects.

Outreach: Projects that process information about nanotechnology projects in the EU for various interested parties; dialog procedures also fall within this sector.

Safety: Processes and technologies that improve the safety in certain sectors, such as biosensors, novel filters, but also nanomaterials to strengthen structural elements in the construction industry.

The comparison with the much more modest Nano-EHS-budget in the past clearly shows the change here (5th RP: about 2.5 mill. €, 6th RP 6 about 30 mill. €).

This dossier describes a selection of 22 current projects dealing with safety research as related to nanotechnology. (For the projects in the framework of the 6th RP, see NanoTrust-Dossier 005en.)

Projects

An overview of the EU-funded projects can be gained by examining the compilations provided by EU bodies[7] as well as the talks held by EU representatives and lists published, for example, by the German chemical industry[8] and the EU databank CORDIS[9]. The compendium of the Nanosafety-Clusters[10] also provides a detailed overview of the relevant projects.[11] The EU NanoSafety-Cluster is an initiative of the EU Commission (DG Research NMP). In the framework of this project, the synergies between the projects of the 6th and 7th RP – which treat aspects of nanosafety – are to be strengthened. In principle this encompasses projects related to ecotoxicology, exposure assessment, risk assessment and standardisation.

ENNSATOX

Title: Engineered Nanoparticle Impact on Aquatic Environments: Structure, Activity and Toxicology

Coordinator: Andrew Nelson, Centre for Molecular Nanosciences (CMNS), School of Chemistry, University of Leeds, UK

Duration: July 2009 to July 2012

Project costs: 3,655 mill. €

EU funding: 2,816 mill. €

Homepage: www.ennsatox.eu

The goal of ENNSATOX is to investigate the environmental effects of various synthetic nanoparticles from the time of their release to their potential uptake by organisms, particularly in rivers and lakes. Beyond experimental studies, this project also includes the development of a theoretical model that can simulate the different phases in the transport of nanomaterials.

ENPRA

Title: Risk Assessment of Engineered Nanoparticles

Coordinator: Lang Tran, Institute of Occupational Medicine (IOM), Edinburg, UK

Duration: July 2009 to July 2012

Project costs: 5,13 mill. €

EU funding: 3,7 mill. €

Homepage: www.enpra.eu

ENPRA is examining the impacts of selected and commercially used nanomaterials, whereby the different target organs (lungs, cardiovascular system, kidneys etc.) and different mechanisms of damage (see Nano Trust-Dossier 012en) are being determined. Laboratory data from cell experiments are compared with those from in-vivo models. The project relies on the comprehensive experience of US universities and research facilities and is coordinated with the OECD's ongoing test program on nanosubstances.

HINAMOX

Title: Health Impact of Engineered Metal and Metal Oxide Nanoparticles Response, Bioimaging and Distribution at Cellular and Body Level

Coordinator: Sergio E. Moya, Centro de Investigación Cooperativa en Biomateriales (Spanien)

Duration: October 2009 to October 2012

Project costs: 2.93 mill. €

EU funding: 2.3 mill. €

Homepage: www.hinamox.eu

HINAMOX deals with the impacts of several metal-oxide nanoparticles – TiO_2, ZnO, Al_2O_3, CeO_2 etc. – on human health and on biological systems. Such materials are already in use in industrial production processes and are components in several products, for example catalytic converters and UV protection (TiO_2, ZnO), as protective paints for ships (CuO), as coating material (Al_2O_3), but also as polishing media (CeO_2) and in electronic components (such as oxides of rare earths). The investigations are designed to improve our understanding of the possible effects of the entire class of metal oxides.

Previously published papers show that metal ions can apparently trigger neurodegenerative diseases such as ALS (amyotropic lateral sclerosis), Alzheimer's and Parkinson's, and the transport of manganese oxide nanoparticles via the olfactory nerve into the brain of rats has been confirmed as a potential channel. One major focus is on the distribution of these materials both in individual cells as well as in the overall body, whereby different methodologies are being used. For detection using PET (Positron Emissions Tomography), radioactively tagged nanoparticles were produced. Other imaging processes[12] are being applied to determine the distribution of the nanoparticles in the cells.

InLiveTox

Title: Intestinal, Liver and Endothelial Nanoparticle Toxicity – development and evaluation of a novel tool for high-throughput data generation

Coordinator: Martha Liley, CSEM (Centre Suisse d'Electronique et de Microtechnique SA)

Duration: May 2009 to July 2012

Project costs: 3.42 mill. €

EU funding: 2.4 mill. €

Homepage: www.inlivetox.eu

In InLiveTox, an improved in-vitro model is being developed to describe the effects of nanoparticles taken up via food, especially effects on the gastrointestinal tract and the liver. For this purpose, a novel system was developed to observe the reactions of various cell cultures to the introduction of nanoparticles; these cultures are grown successively in microscopically small channels flushed by fluids. This consortium also includes a US research facility (University of Rochester)

MARINA

Title: Managing Risks of Nanomaterials

Coordinator: Lang Tran, IOM (Institute of Occupational Medicine) Edinburgh, UK

Duration: November 2011 to November 2015

Project costs: 12.48 Mio. €

EU funding: 9.0 mill. €

Homepage: www.marina-fp7.eu and http://www.iom-world.org

A total of almost 50 industrial companies (including BASF) and scientific facilities are combined in the very large joint project MARINA, coordinated by the Institute of Occupational Medicine of the University of Edinburgh; other organizations that are involved in employee protection and occupational safety are also participating (FIOH/Finland, IST/Switzerland, RIVM/The Netherlands). An Austrian partner, the University of Salzburg, is also involved. The goal is to develop reference methods for dealing with the risks of synthetic nanomaterials. The project consortium strives to develop valid reference procedures based on the experience and results of the individual subprojects, funded by the EU, to enable risk assessments and to better deal with the risks. The participation of industrial partners and experts from China, Russia, Japan and the USA is designed

to help coordinate the activities globally. Cooperation is also being sought with the ERA-net and other projects of the 7th RP, as are cooperations with national research projects and the OECD working group on nanomaterials (OECD-WPMN).

ModNanoTox

Title: Modelling nanoparticle toxicity: principles, methods, novel approaches Toxicology

Coordinator: Eugenia Valsami-Jones, Natural History Museum, London, UK

Duration: November 2011 to November 2013

Project costs: 1.28 mill. €

EU funding: 1.0 mill. €

Homepage: *(under construction)* lib.bioinfo.pl/projects/view/32734

The goal of ModNanoTox is to develop well-documented models on the long-term behavior of synthetic nanoparticles in organisms and in the environment. Comprehensive preliminary studies on the physico-chemical properties of nanoparticles and their reactive behavior will be used to predict their toxicity; this approach can also provide information on the behavior of these materials in the environment.

NanEx

Title: Development of Exposure Scenarios for Manufactured Nanomaterials

Coordinator: Martie van Tongeren, Institute of Occupational Medicine (IOM), Edinburgh UK

Duration: December 2009 to November 2010

Project costs: 1.01 mill. €

EU funding: 0.95 mill. €

Homepage: www.nanex-project.eu, lib.bioinfo.pl/projects/view/12016

In NanEx, a catalog of realistic scenarios is being developed for potential impacts of synthetic nanoparticles at industrial workplaces, of various uses by consumers as well as of delayed releases into the environment. The project investigates three key types of nanomaterials: (1) long and thin, fiber-like particles, for example carbon nanotubes (HARN, "high aspect ratio nanomaterials"), (2) materials that have already been produced in large amounts (for example ZnO, TiO_2, carbon black), and (3) special nanomaterials such as nanosilver. This project yielded a databank[13] on the exposure scenarios for workers who come into contact with carbon nanotubes (CNT), nanosilver, a nano-TiO_2 during the production and processing phases. A summary of the results was published in early summer 2011.[14]

NANODEVICE

Title: Modelling Novel Concepts, Methods and Technologies for the Production of Portable, Easy-to-Use Devices for the Measurement and Analysis of Airborne Nanoparticles in Workplace Air

Coordinator: Kai Savolainen, Finnish Institute for Occupational Health (FIOH), Finnland

Duration: April 2009 to April 2013

Project costs: 12.28 mill. €

EU funding: 9.49 mill. €

Homepage: www.nano-device.eu

Due to the lack of robust and inexpensive instruments, the nanoparticle concentrations in the air at the workplace cannot be measured at the present time. NANODEVICE is devoted to studying innovative concepts and practicable methods for identifying synthetic nanomaterials, methods that can also be used at the workplace. Beyond the development of such instruments, the goal is also to test and calibrate them. The consortium consists of more than 20 partners including institutions involved in employee protection (e.g. the Finnish Institute of Occupational Health and the Institut für Arbeitsschutz der Deutschen Gesetzlichen Unfallversicherung), several Scandinavian universities (Lund, Stockholm, Copenhagen) and companies (TSI GmbH and Grimm Aerosol Technik GmbH in Germany, Dekati Oy in Finland, Naneum Ltd. in the UK) – all have expertise in the sector of aerosol measurements.

NanoFATE

Title: Nanoparticle Fate Assessment and Toxicity in the Environment

Coordinator: Klaus Svendsen, NERC (Centre for Ecology and Hydrology), Wallingford, UK

Duration: April 2010 to April 2014

Project costs: 3.25 mill. €

EU funding: 2.50 mill. €

Homepage: www.nanofate.eu

NanoFATE is devoted to systematically deepening our knowledge about the behavior and the fate of synthetic nanoparticles that enter the environment. Although numerous EU-funded projects (such as NANOTOX, CELLNANOTOX, IMPART, NANOSH, NanoReTox) have examined the human-toxicological effects of new nanomaterials, similarly detailed studies on the interactions between soil and aquatic systems are missing. In a first step, nanoparticles tagged with fluorescent markers or ions are being developed. These can also be followed over the course of their degradation processes. The results of these observations provide the basis for testable models on the environmental behavior of nanomaterials. The goal is to determine the type and amount of synthetic nanoparticles released into the environment by consumer products. This includes examining the effects of particle properties (e.g. size distribution, form, surface) on their toxicity. Microscopical and physical detection methods are used to analyze the interactions of such nanoparticles with biological systems and the environment.

Nanogenotox

Title: Towards a method for detecting the potential genotoxicity of nanomaterials

Coordinator: Anses – French Agency for Food, Environmental and Occupational Health Safety

Duration: March 2010 to March 2014

Project costs: 6.0 mill. €

EU funding: 2.90 mill. € (as co-funding though the program EU-Health & Consumers)

Homepage: www.nanogenotox.eu/

Nanogenotox is not directly a part of the 7th RP but rather a Joint Action, about half of which is funded by the participating European states. The task of this project is to study the gene toxicity (i.e. the damaging effect on the genetic material of organisms) of selected nanomaterials. Information is being collected on the impacts on humans and the environment of about twenty differently modified nanomaterials from the group of silicon dioxide (SiO_2), of titanium dioxide (TiO_2) and carbon nanotubes (CNT). Beyond the exact characterization of the materials (including x-ray diffraction and Raman spectroscopy), CNT samples are radioactively (^{14}C) tagged in order to detect them in the subsequent toxicity experiments. Genetoxic data from in-vivo- and in-vitro experiments are compared with one another and complemented by additional information on nanomaterial accumulation in particular target organs.

NanoHouse

Title: Cycle of Nanoparticle-Based Products used in House-Coating

Coordinator: Francois Tardif, CEA (Commissariat à l'Énergie Atomique et aux Energies Alternatives), Grenoble, Frankreich

Duration: January 2010 to July 2013

Project costs: 3.1 mill. €

EU funding: 2.4 mill. €

Homepage: www-nanohouse.cea.fr

The task of NanoHouse is to comprehensively evaluate environmentally relevant and health-related effects of nanoproducts used in house construction; the focus is on paints and coatings with TiO_2- and nanosilver components, whose impacts and fates are being more closely examined. The first goal is to quantitatively measure the nanoparticle flows during the application as well as during the ageing of the paints and coatings. Beyond the emissions due to weathering and mechanical destruction, solutions for the disposal of these substances at the end of their useful lives are also being discussed. The goal is to comprehensively assess the potential environmental, health- and safety-related effects of these nano-components in construction materials.

NanoImpactNet

Title: The European Network on the Health and Environmental Impact of Nanomaterials

Coordinator: Michael Riediker, Institut universitaire romand der Santé au Travail, Schweiz (IST)

Duration: April 2008 to April 2012

Project costs: 3.19 mill. €

EU funding: 2.0 mill. €

Homepage: www.nanoimpactnet.eu

This large network of partner institutes from numerous countries is designed mainly to exchange information about new knowledge as well as knowledge gaps in the health- and environment-related impacts of nanoparticles. The vehicles for this effort are publically accessible workshops, advanced training events and reports. Beyond promoting cooperation between projects and researchers, the idea is to communicate the research results to the stakeholders and to convey their requirements back to the researchers. This is also a step forward in implementing the EU Action Plan for Nanotechnology and therefore promotes the responsible and safe development of nanotechnology in Europe. Additional goals include harmonised protocols for standardized tests. Partners include state-owned institutions (such as the French CEA, the German DGUV-BIA, the Swiss EMPA, the Finnish FIOH, the Dutch RIVM and the British Health and Safety Laboratory HSE-HSL), as well as scientific institutions (IOM, Edinburgh, Demokritos Research Center in Athens, Dublin Institute of Technology, etc.) and universities (Bern, Copenhagen, Plymouth, Heriot-Watt University, University College Dublin, Wageningen University).

NanoLyse

Title: Nanoparticles in Food: Analytical Methods for Detection and Characterisation

Coordinator: Stefan Weigel, RIKILT – Institute of Food Safety, Niederlande

Duration: January 2010 to October 2013

Project costs: 4.05 mill. €

EU funding: 2.95 mill. €

Homepage: www.nanolyse.eu

The goal of NanoLyse is to develop approved methods for analyzing synthetic nanomaterials in food and drinks. This will help document all types of nanomaterials that find application in foods or in food contact materials. Imaging methods should be able to rapidly distinguish samples containing nanoparticles from those that do not. Electron microscopy and automated evaluation programs will simplify preparatory steps, reduce costs and help achieve high throughput rates. Additional analytical procedures (such as chromatography and mass spectroscopy) will help characterize and quantify the contained nanoparticles. Beyond validating these procedures using reference materials, currently available products (that advertise their nanocomponents or in which such components can be assumed) will be analyzed in greater detail. This will demonstrate the applicability and reliability of the methods.

NANOMMUNE

Title: Comprehensive Assessment of Hazardous Effects of Engineered Nanomaterials on the Immune System Toxicology

Coordinator: Bengt Fadeel, Karolinska Institutet, Stockholm

Duration: September 2008 to September 2011 *(completed)*

Project costs: 4.31 mill. €

EU funding: 3.36 mill. €

Homepage: www.nanommune.eu

NANOMMUNE examined the influence of synthetic nanomaterials on the immune system and their potential negative health effects. The immune system protects humans from the effects of foreign substances entering the body. The concern has been that synthetic nanoparticles also have unknown immunotoxic impacts. The project was designed to determine the toxic potential of selected nanomaterials (gold, silver, ceroxide, iron oxides, carbon nanotubes); the final report has not yet been published.

NanoPolyTox

Title: Toxicological impact of nanomaterials derived from processing, weathering and recycling of polymer nanocomposites used in various industrial applications

Coordinator: Socorro Vázquez-Campos, LEITAT Technological Centre, Barcelona, Spain

Duration: May 2010 to May 2013

Project costs: 3.30 mill. €

EU funding: 2.43 mill. €

Homepage: www.nanopolytox.eu

NanoPolyTox is tasked with determining the changes in the physical and toxic properties of three different nanomaterials (nanotubes, nano-clay minerals, metal-oxide nanoparticles) that are used in combination with polymers as filling materials. The changes will be documented over time and under the influence of weathering. Nanomaterials are being examined in vitro and in vivo, in their original condition as well as in the condition in which they are extracted from nano-component-containing materials at various phases of their life-cycle. The results should help to select suitable processes to extract nanomaterials from the surrounding matrix for recycling purposes.

NanoReTox

Title: The reactivity and toxicity of engineered nanoparticles: risks to the environment and human health
Coordinator: Eugenia Valsami-Jones, Natural History Museum, London, UK
Duration: December 2008 to December 2012
Project costs: 5.19 mill. €
EU funding: 3.19 mill. €
Homepage: www.nanoretox.eu

NanoReTox is designed to better describe the EHS-risks of synthetic nanomaterials based on new research results. One focus is on the effect of the environmental conditions under which metallic nanoparticles are released on bioavailability – and therefore on toxicity. The cell reactions of mammals and aquatic animals will be analyzed for intruding nanoparticles by microscopically examining tagged particles. This effort is restricted to synthetic metallic nanoparticles, which are already well characterized. Aquatic organisms such as marine snails and zebra fishes, which are very sensitive to nanotoxicity, are the preferred indicators.

NanoSustain

Title: Development of sustainable solutions for nanotechnology-based products based on hazard characterization and LCA
Coordinator: Rudolf Reuther, NordMilijö AB, Sweden
Duration: May 2010 to May 2013
Project costs: 3.2 mill. €
EU funding: 2.5 mill. €
Homepage: www.nanosustain.eu

NanoSustain is designed to develop innovative solutions for all phases in dealing with nanotechnology products – up until the landfill or recycling stage. Four nanomaterials are being examined in greater detail: nano-cellulose, CNT, nano-TiO_2, as well as nano-ZnO. Some data on the respective health-related and environmental risks are already available; beyond this, practical measurements are being conducted on the release of nano-components, for example on the behavior of nano-coatings when glass is recycled and on the fate of the CNTs contained in epoxy materials during incineration.

NanoTransKinetics

Title: Modelling basis and kinetics of nanoparticle interaction with membranes, uptake into cells, and sub-cellular and inter-compartmental transport
Coordinator: Kenneth Dawson, University College, Dublin, Ireland
Duration: November 2011 to November 2014
Project costs: 1.3 mill. €
EU funding: 0.99 mill. €
Homepage: www.nanotranskinetics.eu

The aim of NanoTransKinetics is to substantially improve the models used to describe biological (and therefore also toxic) interrelationships between nanoparticles and living organisms. Here, consideration is being given to the influence of proteins and lipids, which adhere to nanoparticles – the so-called "protein corona". Experimental data from numerous projects of the 6th and 7th RP, for example on the distribution of nanoparticles in cells, their passage though cell membranes and partly also from in-vivo studies, are being called upon to develop new predictive models. The goal is a rapid classification of nanoparticles based on their physico-chemical properties and structure. Such an instrument would be very advantageous for nanosafety research and for the regulatory efforts.

NanoValid

Title: Development of reference methods for hazard identification, risk assessment and LCA of engineered nanomaterials
Coordinator: Rudolf Reuther, NordMiljö AB, Sweden
Duration: November 2011 to November 2015
Project costs: 13.4 mill. €
EU funding: 9.6 mill. €
Homepage: www.nanovalid.eu

The aim of NanoValid is to develop reference methods and materials to identify and assess the risks of synthetic nanomaterials in close cooperation with the similarly oriented project MARINA (see above). This is slated to become a European flagship endeavor that can deliver the foundations for the methods and materials required in the nanosafety sector. At this stage, currently available analysis and test procedures are being examined and compared to one another. Improved reference methods will be adapted, validated and tested in selected case studies. This will be done in a consortium including standardization institutions and industrial companies. The consortium encompasses nearly thirty partners, not only from Europe but also from Canada, India, Brazil and the US. The US environmental agency EPA is associated with the project by an agreement. The University of Salzburg is the Austrian participant.

NEPHH

Title: Nanomaterials-related environmental pollution and health hazards throughout their life-cycle
Coordinator: EKOTEK S.L. (Spanien)
Duration: September 2009 to September 2012
Project costs: 3.1 mill. €
EU funding: 2.5 mill. €
Homepage: www.nephh-fp7.eu

NEPHH seeks to better estimate the environmental and health-related risks of nanostructures over the course of their use. These investigations are initially concentrating on selected, commercially available silicon materials (SiO_2, silicate compounds – MMT, glass nanofibers and foamed glass materials). These materials are incorporated onto various plastic materials made of polyamides, polypropylenes and polyurethane foams. This will be followed by examining the behavior of these test patterns under realistic conditions; the risks arising from the nanoparticulate components will then be determined. The goal is to minimize or completely eliminate these impacts.

NeuroNano

Title: Do nanoparticles induce neurodegenerative diseases? Understanding the origin of reactive oxidative species and protein aggregation and mis-folding phenomena in the presence of nanoparticles
Coordinator: Kenneth Dawson, University College, Dublin, Ireland
Duration: February 2009 to February 2012
Project costs: 4.8 mill. €
EU funding: 2.5 mill. €
Homepage: www.neuronano.eu

To date, the full details on the factors that allow nanoparticles to pass the blood-brain barrier are unknown[15]. NeuroNano examines the effect of nanoparticle size, shape and

composition, along with the role of the adsorbed corona of biomolecules (see above). Overall, this multidisciplinary project is designed to shed light on the (potential) role of nanoparticles in the development of neurodegenerative diseases.

QNano

Title: A pan-european infrastructure for quality in nanomaterials safety testing

Coordinator: Kenneth Dawson, University College, Dublin, Ireland

Duration: February 2011 to February 2015

Project costs: 9.2 mill. €

EU funding: 7.0 mill. €

Homepage: www.qnano-ri.eu

Rather than being devoted to a separate research topic, QNano is designed to interlink and support facilities that provide the necessary infrastructure for investigating and characterizing nanosubstances. QNano strives to be a "generally accessible European resource for research, for regulatory aspects and for industry needs in the sector of nanosciences and nanotechnology". This infrastructure support is designed to provide transnationally accessible facilities, training and advanced education opportunities as well as standardized nanomaterials for test purposes. Nearly thirty institutions are participating, among them the Institute for Health and Consumer Protection in Ispra, the KIT in Karlsruhe, the Munich Helmholtz Zentrum, the German DGUV-BIA and the BfR, along with universities in Leeds, Tel Aviv, Munich, Wageningen, Exeter, Edinburgh and Paris-South.

Conclusions

In the 7th RP, the EU Commission has massively increased funding for research projects that deal with the risk- and safety-relevant aspects of nanotechnologies (compared with preceding periods). Numerous approaches promise a significant knowledge gain within the 7th RP timeframe and beyond. Much like in the 6th RP, the Austrian participation in these EU-wide EHS projects has been minimal up to the present time. The direction that the EU has taken in promoting safety research in the nanotechnology sector is clearly recognizable: beyond the clearly increased funding level, priority is being given to projects that feature a higher level of networking both in their thematic scope and among participating institutions, and that therefore create synergies. This reveals a trend away from the funding of purely stand-alone projects. An additional focus lies in the funding of projects designed to promote information processing and the exchange of knowledge.

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