

WORK PROGRAMME 2009

COOPERATION

THEME 4

***NANOSCIENCES, NANOTECHNOLOGIES, MATERIALS AND
NEW PRODUCTION TECHNOLOGIES - NMP***

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Objective

The principal objectives of this Theme are to improve the competitiveness of European industry and to generate knowledge to ensure its transformation from a resource-intensive to a knowledge-intensive base, by creating step changes through research and implementing decisive knowledge for new applications at the crossroads between different technologies and disciplines. This will benefit both new, high-tech industries and higher-value, knowledge-based traditional industries, with a special focus on the appropriate dissemination of RTD results to SMEs. These activities are concerned with enabling technologies which impact all industrial sectors and many other Themes of the 7th Framework Programme.

I Context

I.1 Approach for 2009

The core objective of Theme 4 '*Nanosciences, Nanotechnologies, Materials and new Production Technologies – NMP*' is to fund research, development, demonstration, and coordination projects that will contribute, either on their own or by enabling further development, to **the transformation of European industry** from a resource-intensive to a **knowledge-intensive industry**, thus meeting the challenge imposed by the new industrial revolution and competition at global level, as well as environmental challenges. This transformation is essential in order to produce, in a sustainable manner, high added value products, embedding European cultural values through design and this in turn is essential not only to prevent the relocation of European industry to other areas of the world, but also create new industries, and hence growth and employment within Europe. The competitiveness of more mature industries is also largely dependent on their capacity to integrate knowledge and new technologies.

The competitiveness of European industry is promoted by **generating step changes in a wide range of sectors and implementing decisive knowledge for new applications** at the crossroads between different technologies and disciplines. Research will be focused on generating **high added-value products and related processes and technologies** to meet customer requirements as well as growth, public health, occupational safety, environmental protection, and societal values and expectations. The **sustainability** concern (balance in economic growth, social well-being and environmental protection) resides at the centre of any industrial RTD development. Environmental challenges such as climate change and resources scarcity are the sources of both constraints and opportunities for technological developments.

Furthermore, during the last few years, much effort has been spent by the stakeholders within the European Technology Platforms (ETPs) around the definition of strategic research in about 30 EU sectors. Due to its multisectoral nature, the NMP Theme is the most concerned by the ETPs. Integrating the long-term vision that industry itself provides will greatly enhance the effectiveness of RTD related to long-term challenges, also allowing benefits for additional sectors and other stakeholders to be included, through the development of generic technologies. A key issue will be to integrate competitiveness, innovation and sustainability into the NMP related research activities as well as initiatives capable of fostering the dialogue with society at large, together with education and skills development.

The NMP work programme 2009 is characterised by a limited number of topics compared to the previous years, due to the move towards the annuality of the budget allocation. Topics are proposed on the basis of the NMP multiannual strategy as defined in the Framework Programme and the Specific Programme Decisions, as well as on the NMP project portfolio: the research activities

proposed for 2009 either address topics not yet covered or topics complementary to previous work programmes. . The international dimension remains an important aspect of the NMP work programme 2009.

In ensuring continuity with previous programmes and calls, NMP has evolved on the basis of the acquired experience, of the challenges imposed by the needs of European industry, as well as of its projects' portfolio. It is clear that with this very wide applicability, selective choices will have to be made as the Theme evolves over the duration of the Framework Programme and to address emerging scientific and societal issues as well as new technological challenges. The strategic approach is strongly focused on demonstrable added value in EU industry arising from a proper appreciation of the potential of nanotechnologies, materials and production technologies. It will be essential to ensure the uptake of knowledge generated through effective dissemination and use of the results

Theme 4 is structured as follows:

a) Three thematic activities:

- **Nanosciences and Nanotechnologies** activity in 2009 provides support to research and innovation in industries active in the life sciences and energy markets. The topic proposed on molecular manufacturing has high long-term application potential in a number of sectors. It is also proposed to address the life cycle of nanotechnology-based products in order to meet the requirements for the use, re-use and recycling or disposal of nano-technology based products, whilst risk assessment related activities to collect information on scenarios with regard to exposure to nanoparticles, complement ongoing research in the field. Best practices and coordination between researchers and the business world to support exploitation of results are promoted;

- **Materials**, which in 2009 will focus on developing the understanding and control of several families of new materials with high application potentials in sectors such as information technology, health, transport, chemical technology, and construction. Some examples of targeted materials are graphene-related nanostructured materials, oxides, biomimetic gels and polymers, biomass composite materials and light high-performance composites.

- **New Production Technologies** where topics proposed for 2009 represent a step further towards developing knowledge-based factories on a technology life-cycle basis. The focus of the research is on two major sub-areas, both of them presenting a wide range of applications in different sectors: 1) Adaptive production systems and 2) rapid transfer and integration of technologies into the design and operation of manufacturing process.

b) **'Integration'**, a fourth activity as such, aims at developing new applications and new approaches in different industrial sectors by combining research from the first three activities. This is a *'deliverables-driven'* integration to generate high added value products, with particular - but not exclusive - reference to industrial and regulatory needs and challenges identified with the European Technology Platforms. For 2009, the focus is on either multi-sectoral or multi-application activities such as: reducing the environmental footprint of energy intensive industries, demonstrating the viability of an innovative and knowledge-based tooling industry and addressing cross-thematic issues relating to the development of new flexible, sustainable biorefinery concepts. The nano-medicine related research topic aims at developing new nanotechnology-based solutions for molecular diagnostics and imaging,

I.2 Research relevant for SMEs

The NMP Theme is particularly relevant to SMEs from within all industrial sectors due to their

needs and roles with respect to advanced technologies. SMEs can participate in each and every call for proposals implemented by the NMP Theme. Moreover, **dedicated calls for Collaborative Projects targeted to SMEs** are implemented with the aim of reinforcing their scientific and technological base and of validating innovative solutions. Priority will be given to proposals demonstrating that SMEs play a leading role and that they represent at least 35% of the requested EC contribution.

I.3 International Cooperation

The increasingly important *international dimension* of industrial research requires a well-coordinated approach to working with third countries and in international forums. The NMP Theme is open to the participation of third countries where there is evident mutual benefit, either in terms of excellence of the research and/or in terms of an increased impact. Some topics have been specifically highlighted as being research areas which are particularly well suited for international cooperation. In addition, specific actions may include:

- coordinated calls to address objectives of mutual interest with industrialised countries and countries having signed an S&T cooperation agreement;
- specific initiatives (such as technical workshops and similar events, in particular in the fields of materials sciences and nanomaterials, in order to identify topics of mutual interest for future coordinated calls and/or for Specific International Cooperation Actions - SICAs¹) to promote the participation of emerging economies and developing countries (see Annex 1 – International Cooperation Partner Countries - ICPC).
- the Intelligent Manufacturing Systems (IMS) scheme²
- the development of internationally harmonised standards and nomenclature;
- dialogues with major countries on a '*code of conduct*' for the responsible and safe development of nanotechnology;
- coordinated actions with researchers in other world regions.

Initiatives to coordinate and exchange research data are encouraged (such as in the environmental, safety and health issues for nanotechnologies), paving the way for a common understanding of regulatory needs by policy makers across the world.

I.4 Cross-thematic approaches and coordination with National and regional activities

The cross-sectoral nature of NMP requires close attention and cooperation with several other Themes of the 7th Framework Programme, in particular Health, Food, Security, Space, ICT, Energy, Environment and Transport. Cross-thematic areas are addressed through **joint calls** published jointly with other Themes, thus ensuring that the same objectives are achieved and through **coordinated calls** to achieve complementary objectives via a coordinated approach. Specific actions to **coordinate programmes and joint activities** conducted at national and regional level will also be carried out through *ad hoc* schemes (in particular ERANET and ERANET-*plus*) so as to promote convergence of research programmes and to reinforce critical mass. Coordination will also be encouraged in areas such as metrology, toxicology, standards and nomenclature, for

¹ SICA are Collaborative Projects where the consortia must include at least four independent legal entities of which at least two must be established in different Member States or Associated countries and at least two must be established in different ICPC countries.

² For more information on IMS: <http://cordis.europa.eu/ims>. The European Community participates according to Article 108(2)(d) of the Financial Regulation.

example, to foster synergies within and between the emerging European Technology Platforms, as well as with other schemes such as COST and Eureka.

I.5 Theme specific information

The work programme 2009 introduces each area and gives a description of the topics for which project proposals are invited. For each topic, the work programme specifies which funding scheme is to be used:

- **Collaborative Projects:** *Small or medium scale focused research projects* and *Large scale integrating projects* (which may include additional activities such as demonstration, innovation-related activities, education and training) are implemented via separate calls. For each funding scheme there are upper and lower limits respectively on the requested EC contribution as specified in Section III on Implementation of calls. **It is important to note that these funding limits are applied as eligibility criteria.**

- **Coordination and Support Actions** may relate to coordination, networking or supporting activities at European and international, national or regional level. The organisation of events, studies, where relevant, organisation and management of joint or common initiatives may be included, as well as activities aimed at supporting the implementation of the Theme, such as dissemination, information and communication and activities to stimulate and encourage the participation of civil society organisations.

The forms of the grant to be used for the funding schemes in this part of the work programme are stated in Annex 3.

NMP focuses on a wide range of industrial sectors and on a wide range of RTD domains.

- The **range of industrial sectors** evidently covers those key sectors which concern industrial production, such as manufacturing and chemical processing, but it also extends to traditional sectors (construction, textiles, etc), which are moving up the high-technology innovation stream, and to other sectors striving to maintain and increase their leading position within the EU (electronics, photonics, medical equipment, etc.).
- The **RTD domains** addressing the RTD challenges for a strategic industrial transformation range from (a) nanosciences and nanotechnologies that are becoming one of the new paradigms and enabling factors across virtually all fields of science and technology, to (b) materials that are rapidly acquiring the knowledge-based features, to (c) the products/production-related technologies that are pushing towards the 'factory of the future', something that will strongly underpin the revolution that is needed.

Industrial involvement is crucial in order to safeguard the industrial relevance of the activities supported in the NMP Theme. Direct industrial participation as partners in projects is encouraged across all topics of the NMP Theme.

The description of each topic, in addition to the technical content and scope, includes any participation requirements (such as industrial participation, where appropriate) as well as related expected impact(s) for the topic.

The **submission** and **evaluation** of proposals for Collaborative Projects (including those dedicated to SMEs) will be organised in **two stages**. The rationale for this is due to the specific nature of Theme 4 – NMP, which is multidisciplinary, cross sectoral and SME intensive, for which a 'bottom-up' approach is encouraged.

The first stage proposal should focus on the S & T content and on clear identification of the intended results, their intended use, and the expected (economic, social, environmental, etc.) impact. It will be evaluated on the basis of two criteria: **scientific quality** and expected **impact**.

Coordinators of retained proposals in stage 1 will be invited to submit a complete proposal that will then be evaluated against the entire set of evaluation criteria.

Participation of women in research and gender dimension

The pursuit of excellence in scientific knowledge and in its technical application towards socially acceptable products, processes and services requires greater inclusiveness of a diversity of perspectives. In particular the overall process of transforming European industry will not be achieved without the talent, perspectives and insights that can be added by a more balanced participation of women and the integration of gender issues in RTD activities.

Increasing the diversity of perspectives particularly (but not exclusively) to gender issues at the level of the NMP objectives and topics may have a particular relevance in areas such as new business and organisational models, increasing the level of comfort and user friendliness provided by materials and industrial products, improved understanding of toxicity and risk and in all areas where industrial technologies research is aimed at medical application (e.g. nanomedicine - diagnostics, drug delivery or regenerative medicine). The NMP Theme is committed to undertake specific measures to ensure practical uptakes of this issue together with industry.

II Contents of Calls

II.1 Activity 1 Nanosciences and Nanotechnologies

Nanosciences and nanotechnologies are widely seen as a multi-disciplinary and integrative RTD approach having huge potential to improve competitiveness and sustainable development across a wide range of industrial sectors. Here the strategic objective is twofold: to generate new knowledge by studying phenomena and manipulation of matter at the nanoscale; and to promote innovation by developing nanotechnologies that will enable the manufacturing of new nanotechnology-based products and/or innovative delivery of services. This will lead to a new generation of high added value, competitive products and services with superior performance across a range of applications.

Emphasis will be placed on the exploration of new concepts and approaches for various sectoral applications, with some emphasis during first calls on equipment related to healthcare and bioscience. This will increasingly require the integration and convergence of emerging technologies at the nanoscale. Interdisciplinary, integrating theoretical and experimental approaches must be promoted. The research will also address the relevant instruments, tools, pilot lines and demonstration activities required for highly novel approaches to nanotechnology-based manufacturing in the most promising industrial sectors.

At the same time this activity will also investigate the impact of nanotechnology on society, human health and the environment, as well as look into the relevance of nanoscience and technology for the solution of societal problems as well as the societal acceptance of nanotechnology. This will include research on potential ethical, public health, occupational safety and environmental protection implications as well as safety, monitoring and sensing, metrology, nomenclature and standards which are becoming increasingly important to pave the way for industrial applications. Actions will be launched to implement the Commission's integrated and responsible approach as well as the measures outlined in the associated Action Plan 'Nanosciences and nanotechnologies: 'An action plan for Europe 2005-2009' (COM(2005) 243).

Knowledge gaps in relation to the risk assessment of nanomaterials and nanotechnologies could currently constitute an impediment to the smooth implementation of regulatory requirements. Coherently, actions may be funded that will facilitate this, thus enhancing industry's capability to provide the full benefits of nanotechnologies, in conditions of trust of and transparency to citizens.

1.1 Nanosciences and converging sciences

Long-term interdisciplinary research into understanding phenomena, mastering processes and developing leading edge research tools and techniques is vital for the future of EU industry. The main objective is to support the development of new knowledge by studying the phenomena and manipulation of matter at the nanoscale in order to open new horizons. The research also focuses on new structures and systems with novel or pre-defined properties and behaviour with attention to possible applications. This involves interdisciplinary approaches in collaborative research that may include several fields of sciences or disciplines such as: biological sciences, physics, chemistry, electronic, engineering, mathematics, environmental and safety related disciplines, cognitive sciences, social sciences, etc.

NMP-2009-1.1-1 Nanobiotechnology: Applying life science principles as model for new nanotechnology-based mechanisms, processes, devices and/or systems

Technical content/scope: Life science-based nano-scale phenomena are highly efficient complex natural processes that could provide an ideal basis for nano-, micro- or macro-technological possibilities in industrial application areas and/or novel and high added value products/services. Nanobiotechnology approaches can allow developing biomimetic concepts towards new classes of industrial processes and devices, integrating engineered and biologically derived components, and/or creating novel forms of bio-based manufacturing. The research should consist of nano-bio-technology research of great novelty encompassing the understanding and/or developing of mechanisms, processes, devices and/or systems with the final aim of opening new ways for future industrial processes. The sole development of new materials (e.g. biomimetic materials) will not be supported under this call. Validation should be included in order to prove the industrial viability of the proposed technological solutions.

Funding scheme: Small or medium-scale focused research projects.

Special features: Research activities proposed under this present call should be complementary and not duplicating those supported via the calls in Theme 2. In order to avoid overlapping with Theme 2 activities, proposals covering the following research areas will not be selected under Theme 4 – NMP: smart nano-biotechnology devices to study biomolecule dynamics in real time, nanobiotechnology for functionalised membranes, bio-interfaces for environmental applications, analysis of the ethical, safety, regulatory and socioeconomic aspects of nano-biotechnology (excluding nanomedicine), as well as analytical tools for the characteristic of nano-particles in the food matrix. This is a selection criterion.

Expected impacts: (i) Pathways going well beyond the state of the art; (ii) potential to increase competitiveness of European industry; (iii) substantial innovation in industry and perspectives for new products with higher added value; (iv) innovative industrial ways contributing 20% reduction of energy use and/or 20% improvement in terms of product quality or process efficiency.

1.2 Nanotechnologies and converging technologies

Europe holds a strong position in nanosciences that needs to be translated into a real competitive advantage for European industry. Exploration of new concepts and approaches for sectorial applications, including the integration and convergence of emerging technologies at the nanoscale, are needed to promote the development of an RTD-intensive European nanotechnology related industry and the uptake of nanotechnologies in existing industrial sectors to promote the step change in industrial performance that is needed.

The main objective is to promote industrial innovation by developing nanotechnologies that will enable both the manufacturing of new, higher performance 'nano-enabled' services, products, components, devices and systems across a range of applications and the development of totally new manufacturing processes. Whenever appropriate, an interdisciplinary approach integrating different technologies, sciences or disciplines should be considered including health, safety and environmental issues as well as modelling, nomenclature, metrology and standardisation.

NMP-2009-1.2-1 Nanotechnology for harvesting energy via photovoltaic technologies

Technical content/scope: There is a growing awareness of the potential that nanosciences and nanotechnologies present to produce breakthrough advances for sustainable energy conversion processes, thus responding positively to the environmental and climate change challenges. There are common scientific problems to solve and technological challenges to overcome in a wide range of

energy technologies, including renewables, to obtain reliable, clean and affordable energy. Thorough investigations of the phenomena at molecular level, up to a scale comparable with the wavelength of the solar spectrum, are essential to improve processes in terms of energy efficiency, thereby bringing real breakthroughs to these technologies. Research should focus on the investigation of the underlying nanometric processes and the nano-scale effects for novel forms of energy harvesting via photovoltaic technologies. The integration of such energy harvesting physical nanostructures with novel materials and goods can also be addressed in the proposed projects.

Funding scheme: Small or medium-scale focused research projects.

Special features: In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation.

Expected impact: (i) Innovative scientific and technical research going well beyond the state of the art; (ii) improved efficiency and more favourable cost/m² upscaleable solutions; (iii) development of new knowledge with a high prospect for potential applications exceeding current price/performance ratios; (iv) contribution to substantial innovations in the European industry and industrial products.

NMP-2009-1.2-2 Molecular factory: manufacturing objects with predictable and controllable properties

Technical content/scope: Molecular manufacturing is intended here as the concept of engineering functional structures at the molecular scale to achieve sub-micro, micro or macro scale objects. Self-assembly processes or self-organisation based on pre-existing components are important ways for a bottom up production. Non-binding target examples are components of atomic precision, such as molecular bearings, telescopic arms, electromechanical systems or nanostructured surfaces presenting specific functionalisation; molecular machines might be built, following new design approaches and their functional capability should be proven at laboratory level. Bio-mimetic concepts are here excluded, but addressed under NMP-2009-1.1.1 above. Of central importance for applications are structures with controlled properties over multiple scales, multi-component structures, and the connection of self-ordered systems with conventionally produced structures and functions. In this way molecular factory might be used as one effective step in a greater production process which creates new, well performing cost-efficient final products. The objective is to achieve components and/or systems with predictable and controllable properties such as the composition and physico-chemical structure. The expected Collaborative Projects should develop sustainable processes for nano-structuring for specific applications which should present high potential industrial and/or market relevance.

Funding scheme: Small or medium-scale focused research projects.

Special features: In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation.

Expected impact: (i) Solutions going well beyond the state-of-the-art whose functionality is demonstrated at laboratory level; (ii) whenever possible, stimulation and acceleration of the industrial take-up of novel nanotechnology-based solutions within existing or new production lines; (iii) increasing added value of components and products with the most promising industrial and market potential and/or improvement of yield, reliability and throughput of the production equipments and/or reduction and prediction of equipment maintenance which guarantees the highest possible quality of manufactured components; (iv) new competitive industrial processes; (v) sustainable development, through the development of environment friendly, resource-efficient products and processes.

NMP-2009-1.2-3 Nanotechnologies – coordinated call with Russia

Nano- and converging technologies allow great progress in the conception, design and realisation of sensors with substantially improved performance, in terms e.g. of specificity, detection limits, response time, limitation of interferences, reduced dimensions, etc. Both the EU, the Candidate Countries and the States associated to the 7th Framework Programme from one side, and the Russian Federation from the other, have remarkable experience and potential for further progress in this complex and challenging field relating to industrial and environmental quality monitoring, control and safety. In each one of the following three research areas, one project is expected to be funded. Moreover, one Support Action is called for in order to make one survey of main Russian infrastructures active in nanotechnology. The proposals should also take into account the exchange of researchers.

Specific features: Proposals for **Small or medium scale focused research projects** which do not include coordination with a Russian project will be considered ineligible. Maximum EC funding: EUR 4.650 million in total for the research topics below, covered in the coordinated call. The Russian Authorities have announced a corresponding equivalent funding from the Russian Federation.

A. *Optical chemical sensing with nano-particles, nano-waveguides and photonic-structures*

Technical content/scope: The projects should aim at development of novel ultra-sensitive and selective optical sensors by making use of nanostructures such as nano-particles, nano-waveguides or photonic structures such as crystal fibres, or of plasmonics, for the detection of chemicals.

Funding scheme: Small or medium-scale focused research projects.

Expected impact: (i) The state-of-the-art in optical nano-structured chemical sensor technology should be significantly advanced in the sensitivity, selectivity and stability of optical chemical sensors; (ii) contribution to improved monitoring and control of industrial processes; (iii) Availability of novel sensors for applications in occupational health, and/or plants safety; (iv) Increased cooperation between EU and Russian organisations.

B. *Wireless Surface Acoustic Wave Physical Sensors for operation in a wide temperature range*

Technical content/scope: To develop piezo-electric Surface Acoustic Wave physical sensor technology operating in a wide temperature range, e.g. from -196 °C up to 650°C with wireless transmission of sensing energy and read-out signal. Applications targeted are those involving harsh environment areas e.g. in monitoring nano-based production processes. The novel sensors should be based on application of nano-science and nanotechnologies.

Funding scheme: Small or medium-scale focused research projects.

Expected impact: (i) The state-of-the-art in wireless Surface Acoustic Wave physical sensors for industrial applications should be significantly advanced; (ii) Improved capabilities should be provided for monitoring and sensing of processes in difficult environments with impact in (nano)-manufacturing, improved nanoscience and nanotechnologies, and others as appropriate; (iii) Improved cooperation between EU and Russian organisations.

C. *Sensing of toxic and explosive agents in air based on metal oxide semiconductor nano-structured materials*

Technical content/scope: Work should aim at exploring novel emerging approaches in metal-oxide semiconductor nano-structured gas sensor science and technology and addressing the theoretical basis, modelling, materials technology and experimental verification of the performance.

Nanostructures are for example nano-crystals, nano-wires, nano-tubes or nano-porous structures. The sensors may be enhanced by the use of nano-structured filters, catalysation of the surface with target specific receptor species or the use of semiconductor hetero-structures and improved design for low power consumption. Specific applications issues relevant to industrial environment and safety (temperature range, pollutants, etc.) should also be addressed.

Funding scheme: Small or medium-scale focused research projects.

Expected impact: (i) A significant increase in sensitivity, selectivity and stability of the gas sensors and a reduction in response time and interferences (e.g. variable humidity), notably for sensing toxic and explosive agents in air or for reducing risks in health and safety critical environments; (ii) The state-of-the-art in nano-structured sensor science and technology should be significantly advanced; (iii) Increased cooperation between EU and Russian organisations.

NMP-2009-1.2-4 *Mapping of nanotechnology and nanostructured materials research infrastructures in Russia*

Technical content/scope: This Support Action should deliver a survey of main Russian infrastructures active in nanotechnology and nanostructured materials in a similar way like it has been done for the EU countries (www.nanoforum.org) thus paving the way to future cooperation. Recommendations for future cooperation should be drawn and actions proposed in the conclusions. No more than one Support Action will be financed.

Funding scheme: Coordination and Support actions (supporting action).

Specific features: The minimum conditions shall be at least two participants, one of which established in Member States or associated countries and the other one in Russia. Maximum EC funding: EUR 350.000 in total

Expected impact: (i) Improved knowledge of Russian research capacity in nanotechnology; (ii) Availability of reliable information to pave the way for future EU-Russia cooperation; (iii) Increased cooperation between EU and Russian organisations.

NMP-2009-1.2-5 **Best practices to lower the barriers for commercialisation of nanotechnology research**

Technical content/scope: Nanotechnology benefits often from integrating interdisciplinary approaches. The interaction and convergence between physics, chemistry and/or biology, and cognitive, nano-, bio- and/or information sciences and technologies, is a challenge. Moreover, the identification of barriers of larger private investments in the field nano- and converging S&T and novel materials, and improved communication between researchers (e.g. in natural and/or social sciences, toxicology and/or economics) and/or investors is now necessary in order to accelerate the successful development of nanotechnology as well as to encourage faster exploitation of results. The proposed Support Action(s) should address the identification of the possible best practices of effective interface, communication, business models and/or 'working together' between various type of researchers and/or entrepreneurs and investors, encompassing the main factors of success. The proposed Support Action(s) could develop and reinforce links between actors and networks focused on technology developments with actors working on financing and/or business plan development. Synergy with events or initiatives to be carried out in several countries is welcome. Actions with different foci may be supported.

Funding scheme: Coordination and Support Actions (supporting action).

Specific features: Where appropriate, specificities shown in different countries can be addressed.

Expected impact: (i) Support to European research; (ii) where appropriate, support to positively facing challenges of young companies (start-ups, spin-offs) to raise funding for innovation; (iii)

support to the transfer of knowledge from the university to industrial production and the market; (iv) contribution to the increase of private investments in the above mentioned fields; (v) implementation of the European Commission's Action Plan for Nanotechnology; (vi) recommendations for future appropriate measures, where needed.

1.3 Health, Safety and Environmental Impacts

The main objective is to support the scientific assessment of the potential health, safety and environmental risks associated with nanotechnology-based materials and products at the earliest possible stage. This involves the generation of quantitative data on toxicology and ecotoxicology and methodologies for generating data. Test methods, exposure assessment and risk assessment methods may need to be developed or modified to be applicable to nanomaterials, as well as methodologies for life cycle analysis. In addition, analytical methods might not be fully suitable and therefore also the development of suitable devices and instruments for measurement are addressed. Research activities will thus contribute to closing the knowledge gap, providing the basis for meeting regulatory requirements and, if need be, developing new requirements, conducive to a safe, responsible and sustainable development. Gender issues should be considered, where appropriate.

NMP-2009-1.3-1 Activities towards the development of appropriate solutions for the use, recycling and/or final treatment of nanotechnology-based products (Joint call with Theme 6: 'Environment - including Climate Change')

Technical content/scope: Improving the understanding of the potential environmental/health impacts of nanotechnology-based products over their life cycle is needed. Proposals under this call should consider specific products or groups of products containing engineered nanoparticles or nanofibres (e.g. filtering systems, lubricants, fuel additives, cosmetics, food additives, packaging materials, etc.). They should gather and, when missing, generate data on the possible impact on human health and/or the environmental impact derived from the use, re-use, recycling and/or final treatment and disposal of nanotechnology-based products. Projects should focus on after-production stages and address the following issues for the product(s) or group of products considered: hazard characterisation (toxicology and ecotoxicology), exposure, environmental and biological fate, transport, transformation, and destiny of nanoparticles. At laboratory scale, projects must also explore technological solutions for recycling and final treatment that present clear advantages compared to the state-of-the-art.

Funding scheme: Small or medium-scale focused research projects.

Specific features: In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities. Nanotechnology-based products with a large potential market and for which the environmental impact is or may become significant within the next decade. Thus, the issues mentioned above will be evaluated under the criteria 'S&T Quality' and 'Impact'. The life-cycle data shall be produced according to the International Life Cycle Data System (ILCD) Handbook. This topic is implemented via a joint call with Theme 6 – 'Environment (including Climate Change)'. See the call fiche in Section IV (call identifier FP7-NMP/ENV-2009-2).

Expected impacts: (i) Innovative solutions setting the base for industrial applications; (ii) potential to increase competitiveness of European industry by developing sustainable products; (iii)

implementation of the Environmental Technologies Action Plan and the Nanotechnology Action Plan; (iv) elements for the possible future revisions of regulation e.g. waste legislation.

NMP-2009-1.3-2 Exposure scenarios to nanoparticles

Technical content/scope: The exposure assessment is one of the necessary steps in the process of risk assessment. To date, information for many nanoparticles is not yet available or is not complete, exposure data still need to be generated and in some cases consensus on measurement techniques need to be developed. One missing element is the availability of exposure scenarios and models, which are needed to perform proper risk assessment of engineered nanoparticles. Proposals should address the development and use of exposure scenarios to nanoparticles, particularly in work environments and with a lifecycle perspective, gathering and integrating data from literature, measurements or analysis- so to assess the health and environmental impacts of nanoparticles. Recommendations on ancillary aspects may also be formulated for e.g. research, required human resources skill, measurement techniques or new personal protective equipment. Exposure at workplace, in the environment or during use can be addressed.

Funding scheme: Coordination and Support Actions (supporting action).

Specific features: In order to ensure relevance and impact of the work, the active participation of appropriate partners (e.g. industry, social partners) represents an added value to the activities and this will be reflected in the evaluation. Ongoing activities, such as observatory NANO³, need to be taken into account. A project duration of 12 months would be appropriate.

Expected impact: (i) Better understanding of the impact of the nanoparticles on health, safety and the environment; (ii) future definition of appropriate measures, where needed; (iii) support to research and regulation; (iv) safe and cost-effective minimisation of the exposure of workers; (v) sustainable and responsible development; (vi) implementation of the Nanotechnology Action Plan.

³ FP7 project observatory NANO: "European observatory for science-based and economic expert analysis of nanotechnologies"

II.2 Activity 2 Materials

Added value materials with higher knowledge content, new functionalities and improved performance are increasingly critical for industrial competitiveness and sustainable development; the materials themselves are the first step in increasing the value of products and their performance.

Research will focus on materials science and engineering, developing new knowledge-based multifunctional surfaces and materials with tailored properties and predictable performance, for new products and processes targeting a wide range of applications. This requires the control of intrinsic properties, processing and production, taking into account potential impacts on health, safety and the environment throughout their entire life-cycle.

Emphasis will continue to be placed on new advanced materials and systems obtained using the potential of nanotechnologies and biotechnologies and/or 'learning from nature', in particular higher performance nano-materials (e.g. nano-composites), bio-materials, artificial materials with electromagnetic properties not found in nature, and hybrid materials, including design and control of their processing, properties and performance. A multidisciplinary approach will be fostered, involving chemistry, physics, engineering sciences, theoretical and computational modelling and increasingly the biological sciences.

Materials characterisation, design methods and simulation techniques are also essential to better understand and control materials phenomena, in particular the structure–property relationships at different scales, to improve materials assessment, reliability and durability, and enable industrial applications of materials by design. The integration of atomic, molecular to macro levels in chemical and materials technologies will be supported for developing new concepts, systems and processes. Issues related to the integration of materials and technologies, particularly for multi-sectoral applications, process development, scaling-up and industrialisation of high added value materials will also be addressed.

Materials are key for technological advances and are highly relevant to all the other Themes of the 7th Framework Programme concerned with research related to the use of materials in their respective fields of application. Therefore, coordinated or joint calls may be launched and, where appropriate, focused international cooperation may be promoted.

2.1 Mastering nano-scale complexity in materials

The frontiers of materials research have been taken to the next level by the availability of technologies allowing the tailoring of material structure at the nanoscale and by the development of material systems made up of components with nanoscale dimensions. Materials based upon these concepts began to emerge with the study of low dimensional structures such as thin-films and interfaces and now encompass a wide range of material research areas, from nanostructured particles to nanostructured composites, coatings and membranes. The key objective is to tailor, at the nanoscale, novel material systems with radically new or enhanced properties and performance based upon our improved understanding of materials nanostructure.

NMP-2009-2.1-1 Nano-structured materials based on graphene

Technical content/scope: In recent years nanostructured films have become a major research area, with applications in sectors such as electronics, optical and magnetic devices, protection coatings, electrochemistry and catalysis. The availability of graphene, i.e. of ultimate carbon films of monoatomic thickness, opens a strong opportunity to develop a new family of nanostructured

materials. Radical advances in their engineering would make them very promising, for example, for the development of post-silicon electronics.

The research focus is the study of nanostructured materials based on graphene as a building block. Research is needed on band gap engineering, high electronic mobility, edge effects, functionalisation of the new materials, interactions with substrates, etc. Potentially new electronic properties should be explored, that could result for example from dimensionality or from the existence of stable vacancies, adsorbed atoms, or atomic impurities. New opportunities could also be opened by the change in physical or chemical properties induced by geometrical manipulations of graphene sheets such as folding, rolling, stitching, or precise and oriented cut-out. Safety issues in the handling of nanostructured materials should be addressed. Fullerenes and carbon nanotubes are excluded.

Funding scheme: Small or medium-scale focused research projects.

Special features: In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation.

Expected impact: Industrial applications in the IT sector (including electrodes, flat panel displays, optoelectronic devices, integrated circuits), as well as in catalysis, chemical sensors and hydrogen storage.

2.2 Knowledge-based smart materials with tailored properties

Smart materials, which provide a wide spectrum of enhanced functionalities and have the potential to replace whole devices, are having an enormous impact in today's modern world. Advances in smart materials have already started to find their way into industrial applications, but there are still immense possibilities to achieve improved functionality by further tailoring the material properties in many areas, from shape memory alloys and electroactive polymers to photochromic materials and tuneable dielectrics. The main objective is to design novel knowledge-based smart materials with tailored properties, releasing their potential for enhanced and innovative applications.

NMP-2009-2.2-1 Oxide materials for electronics applications

Technical content/scope: Recent advances in materials science have demonstrated in oxides some effects hitherto confined to high-purity semiconductors. Transition metal oxides are also expected to allow the incorporation of new functionalities into conventional electronics. This raises hopes in future technologies for the IT industries, as the limits of silicon-based electronics are approaching. Due to the intrinsic difficulty in fabricating high quality complex oxide nanostructures, the ability to control these materials at the nanoscale, underpinning the critical role of interfaces, is seen as highly important.

Research should target the development and use of oxide materials, with a quality comparable to that achieved in semiconductors, to create systems with emergent phenomena or new functionalities, offering potential for a large range of electronic properties. For example, a better understanding is needed of phenomena related to interface studies, tunnelling, polarisation, matching with the semiconductor substrate or strain engineering. The research should focus on achieving a high degree of control over the properties of the material nanostructures, using advanced characterisation approaches, in order to demonstrate realistic prospects for the industrial use of oxides in applications where electrons are controlled, such as electronics/spintronics, magnetoelectronics or optoelectronics. Proposals should include the characterisation of the (nano)material(s). Where appropriate, also safety issues (including characterisation, hazard and exposure) should be considered.

Funding scheme: Large-scale integrating Collaborative Projects.

Special features: In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners and a clear industrial leadership represent an added value to the activities and this will be reflected in the evaluation.

Expected impact: Preparation of the post-silicon era with new materials for application in electronics. New knowledge on oxide materials, regarding emergent phenomena and new functionalities will enable higher performance products in the IT sector.

2.3 Novel biomaterials and bioinspired materials

Biomaterials are nowadays essential for improving human health, quality of life and environmental protection. Originally foreseen with the aim of minimising rejection by the host organism, they have now entered a new stage in which they can be designed with bioactive properties, exchanging stimuli with the surrounding tissue and inducing specific cellular reactions. Bioinspired materials, on the other hand, take advantage of the knowledge that nature has been optimising over millions of years. Man-made material solutions can now take inspiration from the most complex naturally-organised chemical and biological structures (e.g. from the nanoworld of proteins to macroscopic structures of bone, shell and enamel). The main objective should be to achieve radical innovations in state-of-the-art biomaterials and to design highly performing bioinspired materials learning from natural processes.

NMP-2009-2.3-1 Biomimetic gels and polymers for tissue repair

Technical content/scope: Musculoskeletal disorders and arthritis have become common heavy burdens to the quality of life of people in Europe, causing severe long-term pain and physical disability. Promising cell-based therapies, for example for osteoarthritis and osteoporosis, would involve the use of bioactive molecules coupled to engineered biomaterials locally implanted in the area of injury. The main aim is to use advanced multidisciplinary approaches to achieve local tissue repair and the inhibition of inflammation by designing materials which can match the natural biological environment and stimulate healing. Research should be focused on the development of biomaterials based on natural or synthetic biomimetic gels and polymers, having bioactive agents, which show clear potential for medical applications. Gender and age-related biological differences should be considered, when appropriate.

Funding scheme: Small or medium-scale focused research projects.

Special features: In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation.

Expected impact: Development of such biomaterials will result in biomedical implants having characteristics close to those of natural tissues. The designed structures and approaches should provide remedies and improved strategies to combat musculoskeletal disorders and arthritis. Increased competitiveness of the European biomaterial and biomedical industry is expected.

2.4 Advances in chemical technologies and materials processing

Discoveries of new materials with tailored properties and advances in their processing are the rate-limiting steps in product development in many industrial sectors. Tomorrow's technology is in fact imposing increasingly stringent requirements on chemical technologies and materials processing.

Materials chemistry has the potential to continue making substantial contributions to many fields, including modern plastics, paints, textiles and electronic materials, through the understanding of fundamental chemical interactions and processes. The key objective is to radically improve materials by increasing knowledge in materials chemistry and chemical processes, in particular at the nanoscale, e.g. in areas such as nanostructured catalysts and inorganic-organic hybrid systems, and to make progress in the field of environmentally friendly materials able to substitute currently harmful applications, and in the field of clean, flexible and efficient materials processing.

NMP-2009-2.4-1 New biomass-based composite materials and their processing

Technical content/scope: Biomass, produced by nature or by biotechnology, can substitute fossil resources in the production of a variety of chemicals, fuels, and polymeric materials. Several biomass based products are already on the market, e.g. starch based packaging or biodegradable polymers in textiles. An important objective in biomass exploitation is to improve the processing of biomass-based materials, in order to tailor their properties and to optimise eco- and energy efficiency. In biomass-based composites the specific modulation of the (molecular) structure may give rise to new properties that are not characteristic of the original building blocks. Prime objectives for converting biomass into reinforcement elements for application in polymer-matrix composites include (i) the specific modulation of the molecular architectures of biomass and formation of structural hierarchies, to provide special functionalities, and self-assembly combined with easy processing, (ii) the development of melt compounding technologies based upon biomass (nano)fillers and fibres, and (iii) the exploration of novel processing technologies for production of biomass-based composites, bonded and non-woven structures.

Research should focus on the development of new commercially-viable thermoplastic and thermoset materials with high biomass content (i.e. above 90 % in weight). Hierarchic structures and nanostructured biomass materials (nanohybrids) could be assembled by exploiting self-assembly processes of biomass-based building blocks. Biomass based binders could also be developed to eliminate the need for formaldehyde-based thermoset resins in the processing of biomass-based fibre composites, papers, non-wovens and bioplastics. Attention should also be paid to the life cycle analysis, including industrial safety aspects, and to the cost-effectiveness of the new composite materials in comparison to the materials currently used, as well as to the recovery of any waste generated.

Funding scheme: SME-targeted Collaborative Projects.

Special features: SME dedicated Collaborative Projects are specifically designed to encourage SME participation in research and innovation representing the complete value added of the targeted sectors. In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation.

In order to ensure an efficient implementation and maximum impact of SME-related activities, the following aspects will be evaluated under the criteria 'Implementation' and 'Impact':

- the leading role of SMEs with R&D capacities: the coordinator does not need to be an SME but the participating SMEs should have the decision making power in the project management and the output should be for the benefit of the participating SMEs and the targeted SME dominated industrial communities, and;
- level of SME involvement In addition to the evaluation criteria, please note that only proposals with an SME involvement of the order of 35% or more of the requested EC contribution will be selected.

Expected impact: A reduction of the dependence on fossil resources through the use of novel commercially-viable biomass based composites. These materials, with high biomass content, which are more environmentally friendly and bio-degradable, will provide lighter and stronger alternatives to fossil fuel based composites. An increase of the competitiveness of the European SME-based chemical industry due to large scale pilot production of advanced biomass-based composite materials using biomass-based building blocks.

2.5 Using engineering to develop high performance knowledge-based materials

The design of knowledge-based materials relying upon an accurate control of their properties can take advantage of highly performing modern engineering methods and powerful computer-based tools. The shift towards a higher knowledge-intensive industry demands radical innovation in materials for enhanced performance under increasingly challenging application conditions. Engineering tools, associated with modelling and simulation approaches often based on multi-scale methods, can help include the microscopic structure and properties into materials design, in order to construct more reliable high performance materials, based on an accurate prediction of their in-service behaviour and life-cycle analysis. The key objective is to use advanced engineering in order to design new material systems for specific highly-demanding applications, incorporating microstructural information with a view to enhancing performance.

NMP-2009-2.5-1 Light high-performance composites

Technical content/scope: Novel light-weight high-performance composites, which enable a significant decrease in weight whilst providing a top performance as compared to existing materials, or even a clear improvement in mechanical properties such as increased specific strength, specific stiffness, damage tolerance, ductility, creep and wear behaviour and fracture toughness, are essential for innovation in the transport sector. Lighter but stronger transportation vehicles will be more economical and environment-friendly, by consuming less fuel and emitting less CO₂. In some cases improved damping and enhanced crash/impact absorption capabilities, as well as embedded sensing and self-healing properties, are also sought.

Research should only target radical advances in new light-weight high performance composite materials (i.e. avoiding purely incremental improvements) and should be based on understanding the relationship between composition, processing, microstructure and properties, in particular using advanced engineering and modelling tools. Different types of light-weight composites relevant to the same application field (e.g. automotive, aerospace) can be studied together. Attention should also be paid to the life cycle analysis and to the cost-effectiveness of the new composite materials in comparison to the materials currently used.

Funding scheme: Large-scale integrating Collaborative Projects.

Special features: In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation and priority will be given to proposals showing a clear industrial leadership.

Expected impact: Clear benefit to the land transport, maritime and aeronautic sectors, as well as in moving components of large machinery, with regard to lower fuel consumption, increased competitiveness, protracted usage/life cycle with less consumption of resources, improved safety. Lower carbon dioxide emission in line with European policy objectives.

2.6 Coordinated activities and international cooperation

The cross-sectoral nature of Materials research and the widespread impact of its applications create obvious links with the other Themes under the Specific Programme 'Cooperation'. Cross-thematic areas will be addressed through joint calls published with other Themes, when it is possible to share the same objectives, or through coordinated calls addressing complementary objectives via a coordinated approach.

The increasingly important international dimension of industrial research requires a proactive approach to working with third countries in the field of Materials research. International cooperation activities are, therefore, an important issue, in particular for those research areas where there is clear mutual benefit in terms of knowledge generation and market expansion. Specific actions may be foreseen, such as joint research activities that may be implemented via coordinated calls to address objectives of mutual interest. This may be of interest, in particular, in the case of industrialised countries and those having signed an S&T cooperation agreement which includes the Materials field. In addition, specific Support and Coordinated Actions can promote better links with international co-operation partner countries.

NMP-2009-2.6-1 Novel membranes for water technologies (SICA)

Technical content/scope: One of the major challenges of this century is the provision of safe drinking water for a growing population. In this respect, various membrane technologies for water treatment can be considered as mature (e.g. ultra-filtration, reverse osmosis, electro-dialysis) while other techniques such as membrane distillation or crystallisation are only at their early stages. The shortages in water resources (e.g. in regions of Europe but also of African countries and the Mediterranean partner countries) will require in the near future the availability of more efficient and cheaper processes, fed not only from surface waters or aquifers but also from sea, brackish or waste waters. The most promising developments are awaited from the use of new materials tailored at the nanoscale and from advanced membrane engineering approaches.

Concerning new materials, research is needed on the development of new reverse osmosis membranes which are more stable with regard to chlorine and other disinfectants, fouling resistance or functionalised membranes having, for instance, catalytic or adsorbent activities for the mineralisation or the retention of micro-pollutants, sanitising properties for a chemical free water sanitation, or on-line sensing for continuous chemical and microbial contaminants monitoring and control. These membranes can be produced from nanotubes, mixed matrices, composite materials or self assembling structures. Regarding new engineering and process intensification concepts, research is encouraged on: (i) new membrane production processes allowing a better control of the nanostructure, saving solvents and involving harmless additives aimed at offering better membrane stability, (ii) new progress in electro-dialysis and nano-filtration for converting brackish water into fresh water and in reverse osmosis desalination of deep-seawater for the production of bottled-water (e.g. safer and less energy consuming industrial operations, better management or lower production of waste brines from desalination plants, implementation of "closed-loop technologies") and (iii) the development of robust, safe and efficient membranes to be used in bioreactors for the treatment of industrial, municipal or agricultural wastewaters. Social considerations such as cost and user-friendliness should be considered, when appropriate.

Funding scheme: Small or medium-scale focused research projects.

Special features: SICA for African countries and the Mediterranean partner countries. The specific eligibility requirements are: the minimum number of participants is of at least 4 independent legal entities, of which 2 must be established in different MS or AC and the other two must be established in different African countries or the Mediterranean partner countries.

In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation.

Expected impact: Breakthroughs in the implementation of water reclamation and purification plants. Projects are expected to partly fill the gap between the 'technology push' and the 'market pull' thus contributing to sustainable development, preservation of natural resources and well-being of the society.

II.3 Activity 3 New production

A new approach to manufacturing is required for the transformation of EU industry from a resource intensive to a sustainable knowledge-based, eco-innovative industrial environment and will depend on the adoption of totally new attitudes towards the continued acquisition, deployment, protection and funding of new knowledge and its use, including towards sustainable production and consumption patterns. This entails creating the appropriate conditions for continuous innovation (in industrial activities and production systems, including design, construction, devices, and services) and for developing generic production 'assets' (technologies, organisation and production facilities as well as human resources, while also meeting overall industrial safety and environmental requirements. These production assets will come together in 'Factories made in Europe' with European standards.

The research will focus on a number of strands: the development and validation of new industrial models and strategies covering all aspects of product and process life-cycle; adaptive production systems that overcome existing process limitations and enable new manufacturing and processing methods; networked production to develop tools and methods for co-operative and value-added operations at a global scale; tools for the rapid transfer and integration of new technologies into the design and operation of manufacturing processes; and the exploitation of the convergence of the nano-, bio-, info- and cognitive technologies to develop new products and engineering concepts and the possibility of new industries.

Particular attention should be paid to promoting activities which support the adaptation and integration of SMEs to the new needs of the supply chain as well as to giving an impulse to the creation of high tech SMEs.

3.1 Development and validation of new industrial models and strategies

- No topics for the year 2009 -

3.2 Adaptive production systems

The key objective is to develop production systems and elements for knowledge-based factories through holistic manufacturing engineering concepts. The systems should automatically and continuously adapt production resources and processes in an optimal way with respect to business and production objectives as well as market and technical conditions. Adaptive production systems integrate innovative processes, overcome existing process limitations and handle the transfer of manufacturing know-how into totally new manufacturing related methods. The research focus is on agility, adaptability and anticipation for flexible, small or even single batch oriented production; resource efficient, sustainable production processes; integration of affordable intelligent technologies and process control for optimal production; modular architecture concepts, adaptation of existing manufacturing equipment and resources and implementation of changes related to radically new technologies. The scope includes discrete manufacturing and process industries, supporting also the trend towards miniaturisation, as well as construction.

NMP-2009-3.2-1 Innovative pathways for sustainable chemical production

Technical content/scope: Within the multi-annual strategy for promoting sustainable chemistry, the aim is to achieve more eco-efficient chemical syntheses and corresponding processes with high resource efficiency and reduced amounts of waste and emissions. This complies with the continuous

transformation of energy and capital intensives sectors developing safe environmentally friendly reactions, products, and processes that will improve competitiveness within the chemical industry.

The high level group on Competitiveness of the European Chemical Industry set up by the Commission in 2007⁴ recognises that this enabling sector in Europe is vitally important as a provider of chemical solutions and as a key player in the search for sustainable development.

The research project should investigate novel synthetic reactions for the manufacturing of safer chemicals and address domains such as specific transformations of functional groups and the use of highly selective multifunctional catalysts which are combined with alternatives to traditional solvents. Particular attention should be given to elimination or substitution type reactions, which are among the least atom-economical transformations (i.e. with undesired products remaining at the end of the reaction). Bio-catalytic routes are not considered a priority for this call topic.

Projects should lead to cooperation between branches of chemistry that have not traditionally worked closely together in order to integrate the most recent knowledge gained in this area, especially, the understanding of structural/functional relationships at molecular level.

Funding scheme: Large scale integrating Collaborative Projects.

Specific features: In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation. Priority will be given to proposals showing a clear industrial leadership and significant demonstration activities, in particular to ensure a proper exploitation and dissemination of project results.

Expected impacts: Expected results should provide a strategic advantage and added value to society, in terms of competitiveness, reduction of environmental footprint and industrial safety. Projects should contribute to the renewal of scientific and technological breakthrough in synthesis. 25-30% improvement in resource efficiency and yield is expected combined with a global target of zero-waste production for at least 20% of existing reactions.

NMP-2009-3.2-2 Adaptive control systems for responsive factories

Technical content/scope: One of the main strategic goals for the development of the manufacturing industry is the implementation of intelligent factories, which are able to manage complex and variant production processes.

Distributed multi agent manufacturing technologies will characterise the next generation of the European factories. These systems will involve autonomous re-configurable and collaborative intelligent units capable of self-adapting to different production operations due to planned changes as well as unforeseen variations in both process parameters and variables. As a result, smaller losses of operational time due to planned changes in the process, and changes predicted through progress monitoring should be achieved, and optimal operation should be maintained despite varying conditions. Furthermore, the methodology should have the potential to be applied in different sectors.

The emphasis is on factory level control, though the interface to machines/devices is included in the scope in order to ensure a homogenous system. Research should specifically focus on adaptive control systems for intelligent factories, including the following main development issues and targets:

⁴ see http://ec.europa.eu/enterprise/chemicals/hlg/index_en.htm

- modularity of architectures and new flexible and reconfiguration strategies to be applied to production systems. This aspect is a prerequisite for the new generation of scalable, self-adaptive and interoperable control systems;
- increase of flexibility and performance of knowledge-based processes and automation enabling new agile manufacturing operations. Such features contribute to build new production processes which are able to adapt to new productive targets and needs with a low impact in terms of costs, development, set-up and ramp-up time;
- multilayer, interconnected distributed adaptive control systems – adapting to parametric changes in the manufacturing process and providing optimal control for discrete or continuous processes;
- multi-agent automation and supervision software that will improve distributed intelligence solutions, optimally incorporating human input.

Funding scheme: Small or medium-scale focused projects.

Specific features: In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation. The following issues will also be reflected in the evaluation: (i) to ensure wide industrial impact, proposals are expected to include component manufacturers and Original Equipment Manufacturers (OEM) for future take-up of the new technologies; (ii) proposals are expected to take into account relevant standardisation and interoperability issues as well as further take-up measures in collaboration with Eureka initiatives (i.e. Pro-Factory⁵).

Expected impact: Introduction of autonomous, collaborative and self-adaptive control in production is expected to show significant improvement in factory productivity. In cases of large variations/uncertainties in process parameters; and/or in cases of frequent managed changes in the production, there is potential for as much as a 20 – 30 % improvement in efficiency, accompanied by greater equipment up-time of up to 90%.

3.3 Networked production

- No topics for the year 2009 -

3.4 Rapid transfer and integration of new technologies into the design and operation of manufacturing processes

The key objective is the development of knowledge-based engineering capacities drawing on in-depth understanding of the behaviour of machines, processes and systems. This allows enterprises, in particular SMEs, to respond quickly to changes in a dynamic environment through integration of knowledge from all fields of manufacturing – from manufacturing networks up to the individual components of a production system. Knowledge-based manufacturing aims at innate transfer and protection of knowledge as well as the utilisation of a wide range of tools for integration of new technologies into the design and operation of new manufacturing processes as quickly and efficiently as possible. The research focus is on the development of advanced engineering concepts through knowledge sharing and knowledge distribution and through the integration of modelling, simulation and virtual production tools. The scope includes discrete manufacturing and process industries, as well as construction.

⁵ <http://www.profactory.eu/>

NMP-2009-3.4-1 Automation and robotics for sustainable crop and forestry management

Technical content/scope: The majority of processes entailed in the management of crops are implemented uniformly to whole fields or to all the harvested material. This can result in excessive use of pesticides and other inputs, unnecessary contamination of the environment, sub-optimal crop performance, and excessive time and energy requirements.

In crop and forestry management, competitiveness requires increasing automation in sorting and harvesting, whilst increasing the respect for sensitive key biotopes and biodiversity requires a more discriminate process.

Robotic concepts and other approaches to automated crop and forestry management are now beginning to demonstrate the potential to address these issues. The target systems are predominantly biological in nature and operate in the natural environment, which means that there are many novel issues to address if automated processes are to be effective in practice - of particular importance is the variability of the processes in time and space. Targets (stems, fruit etc) and obstacles vary in size, shape, surface texture, orientation and colour, and operations need to be adapted to the challenging open-air environment so that they are resilient to changes in illumination, humidity, temperature etc. Safety considerations and fail safe technical solutions will be important particularly for robot systems that have significant autonomy from other farm operations, or are even 'free-acting'. Although developments in other sectors will provide valuable inputs and transferable technology, there are still major research challenges to overcome in order to establish innovations that have the potential for significant market penetration.

Research should focus on the following main development issues and targets:

- novel (or transferable) sensors to detect presence and location of biological entities, stage of plant development or quality/chemical characteristics of plant or soil;
- effectors and actuators to apply inputs precisely or manipulate objects physically;
- control models and routines to deliver precise actuation in a variable environment at a speed that is cost effective for crop/forestry management;
- architecture, interfaces, communications etc that permit effective real time operation and control and provide information for record-keeping and to optimise current and future operations
- In order to deliver real progress in this area, with potential for major practical impact, an integrated approach across disciplines (horizontal) and down the supplier chain (vertical) is necessary. The cross fertilisation concept from different fields of application should be encouraged. It will be necessary to identify and focus work around demonstrator systems that allow new technologies to be evaluated in contexts that are meaningful to the agronomic/forest user and thus can open up the necessary vertical integration. Aspects that relate to the delivery of regulatory requirements and/or traceability are also likely to encourage rapid penetration of these new technologies.

Funding scheme: Large-scale integrating Collaborative Projects.

Specific features: A much larger impact can be achieved by involving machinery manufacturers, companies (including SMEs) with specific expertise in sensors, robotics and control in complex environments, farmers, forestry owners, end-users of crop/forestry related products and other stakeholders. Proposals should contain significant demonstration and training activities.

Expected impact(s): New technologies to enhance the precision and automation of crop management could lead to reduction in harvesting costs by 15-35% and 20-30% reduction in the use of crop protection chemicals in the next 5-7 years, and to increased quality and marketability of harvested produce, assuring the maintenance of the world-leading position of the European forestry and agricultural machinery industry in a world market. Moreover, they could lead to the creation of high technology jobs within the agricultural sector that will contribute to sustaining available income in rural areas.

NMP-2009-3.4-2 Holistic and integrated approach to high-performance, reliable and adaptive machine tool design and production

Technical content/scope: Because of the demand for customised products with short delivery times, business must shift from designing and selling physical products to supplying a system of products and services that are jointly capable of fulfilling users' demands, while also reducing total life-cycle costs and environmental impacts.

The machine-tool and production systems industrial sector should base its industrial transformation in the future on its capacity to propose, through a holistic approach in the global market, high added value products and services in which the product is not the machine tool itself, but a capacity of safe production at the best total-life-cycle impact and cost.

The research should focus on a holistic approach to machine tool design, production and use, with complete integration of machine and processes, taking into account improved quality, predictability and cost efficiency. This involves the development of:

- fast, usable, robust and affordable digital design and manufacturing tools for conceptual system design;
- a design environment for new machine-tool concepts, with intelligent links to machining process and product simulation (including animation);
- approaches for handling the complexity of integration of heterogeneous methodologies and tools with local procedural and data management within the design environment;
- new business models and dynamic networking aiming at total life cycle cost optimisation by co-design, considering also environmental and robustness issues, in order to implement the new technologies into the specific business environment of SMEs

Funding scheme: SME-targeted Collaborative Projects.

Specific features: SME dedicated Collaborative Projects are specifically designed to encourage SME participation in research and innovation representing the complete value added of the targeted sectors. In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation. In order to ensure an efficient implementation and maximum impact of SME-related activities, the following aspects will be evaluated under the criteria 'Implementation' and 'Impact':

- the leading role of SMEs with R&D capacities-: the coordinator does not need to be an SME but the participating SMEs should have the decision making power in the project management and the output should be for the benefit of the participating SMEs and the targeted SME dominated industrial communities, and;
- level of SME involvement: In addition to the evaluation criteria, please note that only proposals with an SME involvement of the order of 35% or more of the requested EC contribution will be selected.

The following issues will be reflected in the evaluation: (i) proposals are expected to include significant demonstration elements applying the design environment in real-life case studies including the construction of a demonstrator; (ii) apart from the technical developments, the proposal Impact assessment will consider new business models and dynamic networking in the European machining industry; (iii) this topic is well suited for international collaboration, in particular within the IMS scheme regarding energy efficiency, environmental and industrial safety issues.

Expected impact: Contribution towards new business models in the European machine tool and

machining industry. More specifically, the combination of new business models and the proposed technical developments should result in an ambitious quantified impact whereby:

- Towards a 100% recycling of machine materials and reusing of machine components;
- Energy consumption is reduced by 30-40%;
- Productivity is increased, through reduced cycle time and increased active robustness, by 3-5 times;
- Reliability of high precision processes and machine tools is increased by 50%;
- Process transparency is higher by 100% through extension of the human/ machine interface capability;
- Machine design and build lead time to market is reduced by 50%.

3.5 Exploitation of the convergence of technologies

- No topics for the year 2009 -

II.4 Activity 4 **Integration of technologies for industrial applications**

The integration of knowledge and technologies of the three areas of research above is essential in order to speed up the transformation of European industry and its economy, while adopting a safe, socially responsible and sustainable approach. The research will focus on new applications and novel, step-change solutions responding to major challenges, including the RTD needs identified by the different European Technology Platforms.

This research should enable and sustain the knowledge-based transformation of current industrial sectors and the development of new science-based sectors through the integration of new knowledge from nano-, materials-, and production technologies in sectoral and cross-sectoral applications. The RTD approaches and objectives applied by the partners should lead to results (products, processes, methods, etc.) and impacts which must observe the guidelines of the sustainable development paradigm, namely the public health, worker safety, environmental protection and the societal dimensions, including governance concerns (public awareness and acceptance). Furthermore this research work must constitute an opportunity for Europe to consolidate the optimal normalisation and standards needed.

Several cross-cutting dimensions could be considered while handling the vast array of sectors and applications and could further inspire the emergence of topics:

- **Transforming traditional industry**, which faces the challenge of low-cost competition. It should increase its productivity through new processes, high-added value products and new business models;
- **Fostering scale-intensive and specialised suppliers industry** through the adoption and integration of new advanced technologies thus enabling the improvement of its leadership in the global market;
- **Promoting Science-based Industry** which will play a key role in establishing a high-value European industry. It will need the integration of most of the advanced technologies dealt with in Nanotechnologies, Materials and Production activities, enabling the development of new, high value, products and services, processes and even leading to new industries.
- **Towards a sustainable supply industry** is another key objective in supporting product & productivity innovation, especially for sectors with a large environmental impact.

Joint call on Biorefinery (This joint call was launched in September 2008)

Biorefinery is the sustainable processing of biomass into a spectrum of value-added products (chemicals, materials, food and feed) and energy (biofuels, power and heat). By producing multiple bio-products and bio-energy, a biorefinery takes advantage of components and intermediaries and maximises the value derived from refining operations.

The aim of the joint call is the research, development and integration of innovative technologies to prove the viability related to the entire value chain (biomass production, biomass conversion, safe recycling and/or disposal of waste, conformity of end-products to end-user requirements) of advanced biorefineries. It will be implemented through two topics. The topic 'Sustainable Biorefineries' will be targeted at the funding of a limited number of large, multi-disciplinary, Collaborative Projects addressing bio-products, bio-energy, sustainability and technical and economical viability. The topic "Enhancing exchange of information, synergies and cross-fertilisation between projects in the field of Biorefineries" will further seek to promote coordination of on-going research at European and national levels across Biotechnology, Energy, Industrial Technologies and Environment on distinctive features of the biorefinery concept through a single Coordination Action.

Quality proposals with the intended level of integration are expected to achieve a break-through beyond the "business as usual" scenario. Furthermore, proposals shall necessarily include the sustainability assessment of any proposed solution on the basis of a life cycle approach. This shall be developed with the aim to provide a robust scientific basis for policy and decision making at different levels and scales (from production unit to policy development).

NMP-2009-4.0-1 Sustainable Biorefineries

Scope: Development of advanced biorefineries for sustainable processing of biomass into building blocks for the production of bio-based chemicals, materials, second generation biofuels, power and heat. The biorefineries shall demonstrate their performance, sustainability and feasibility at least at pilot scale in an integrated approach. Part of the biorefinery complex that is closer to the market shall be demonstrated at industrial pilot plant scale.

All proposals shall address the entire value chain from biomass feedstock production, logistics and pre-treatment to the development of thermo-chemical and bio-chemical technologies, including biotechnological routes, for the conversion of different types of biomass feedstock into bio-based products and energy. The utilisation and upgrading of residues and process waste streams and the purification and upgrading of the various products into final marketable services to consumers shall also be addressed. Bio-technological tools for the development of new non-food industrial crops and/ or biomass sources as feedstock may be applied. The upgrading and integration of new stable materials as well as of new non-enzymatic high-selective catalysts may be considered. The integration and optimisation aspects of all the main biorefinery sub-systems shall be described and show progress beyond the state-of-the-art.

With regard to sustainability, all proposals shall assess for the entire value chain the environmental, economic and social sustainability, including consequences due to the competition for food and biomass resources, the impact on water use and quality, changes in land-use, soil carbon stock balance and fertility, net balance of greenhouse gases, impact on biodiversity, potential toxicological risks, energy efficiency. Impacts on international and regional dynamics, end-users and consumer needs, investment feasibility may also be considered.

Funding Scheme: Collaborative Project

Expected Impact: Funded projects are expected to demonstrate the capacity of biorefineries to contribute to European competitiveness and wealth by responding to the need for supplying a wide range of bio-based products and energy in an economically, socially, and environmentally sustainable manner. New competences, new job opportunities and new markets are also expected. Furthermore the development of biorefineries is expected to also contribute to the implementation of several EU policies and initiatives, notably the Lead Market Initiative, the SET Plan, and the Energy & Climate Package in general.

Other information: The participation of relevant industrial partners, along with research organisations, SMEs, end-users and civil society organisations is essential to achieve the expected impact. This will be considered in the evaluation. The proposals may consider opportunities of international cooperation and address international integration of value chains, provided that they respond to sustainability criteria.

NMP-2009-4.0-2 Enhancing exchange of information, synergies and cross-fertilisation between projects in the field of Biorefineries

Technical content/scope: The aim is to promote coordination of on-going research at European and national levels across Biotechnology, Energy, Industrial Technologies and Environment on distinctive features of the biorefinery concept. Information exchange and cross fertilisation may concern any aspect of the feedstock, the conversion and fractionation technologies, the integration of processes and uses of side-streams, the biofuels and the bio-based products, the energy efficiency, the economic, socio-economic and environmental performance, as well as other sustainability issues (impacts on food production schemes, impact on water use and quality, changes in land-use, access to resources, impact on biodiversity, and the net balance of greenhouse gases). Activities should aim to overcome fragmentation in this multidisciplinary field and develop cross-thematic synergies, identifying gaps and overlaps, defining research priority needs and infrastructure. In addition, activities shall involve dissemination of results.

Funding Scheme: Coordination and Support Action (coordinating action)

Expected Impact: Significant improvement is expected in the exchange and use of the information available on biorefinery concepts within the thematic projects, in the identification of complementary research results and the cross-fertilisation to make best use of them, and in the synergies between the thematic projects. Significant enhancement is also expected in the cooperation between key researchers and industries that are active in biorefinery research funded by EU and national programmes.

Other information: The consortium should include a balanced partnership from all scientific domains involved (biotechnologies-agriculture-food, energy, environment and industrial technologies) with solid experience and competence in the field and strong project management skills. The partnership should demonstrate the added value of the cross-thematic collaboration in the proposed action. In that respect, the participation of relevant industrial partners is deemed as essential to achieve the expected impact. This will be considered in the evaluation. Networking and exchange activities with relevant international programmes shall be established. Up to one project may be funded.

NMP-2009-4.0-3 Development of nanotechnology-based systems for molecular diagnostics and imaging

Technical content/scope: Within the objective of reinforcing the competitiveness of European industry addressing healthcare and of improving quality of life, proposals are called for developing and (pre-clinically) validating new nanotechnology-based solutions for molecular diagnostics and imaging, addressing the efficient disease management of tomorrow. This includes e.g. very early and more accurate diagnosis of a disease, support to surgical operations, less or non-invasive methods, better assurance of whether a patient will benefit from a treatment and better monitoring of whether a treatment is successful leading to a more effective usage of medication and timely switching to other treatments, if required. This will also lead to lesser side effects and more cost effective treatment. Projects are expected to establish collaboration between academia, pharma companies and various industries producing and functionalising materials, components, devices, complex agents, equipment and systems for medical treatment. Proposals should include the characterisation of the (nano)material(s) following internationally agreed upon by OECD. Where appropriate, risk assessment (including hazard and exposure) should be considered.

Funding scheme: Large-scale integrating Collaborative Projects.

Specific features: In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation. Large scale integrating projects could include as appropriate activities such as specific modelling, education modules, pre- and co-normative activities, or analysis of existing and required regulations. Gender and age related issues should be considered, where appropriate.

Expected impact: (i) Reinforcement of the competitive positioning of European industry, (ii) better and more reliable diagnosis and/or follow-up of treatment/identification of correct treatment; (iii) delivery of improved healthcare to citizens.

NMP-2009-4.0-4 Reducing the environmental footprint of energy intensive industries

Process Industries and in particular Energy Intensive Industries (EII) still consume very high quantities of natural resources and energy and produce huge amount of waste and harmful emissions. EU Directives such as End of Life (ELV), Waste Electrical and Electronic Equipment (WEEE), waste directives, Integrated Pollution Prevention and Control (IPPC), the Energy Intensive Industries (EII) initiative and the EU Action Plan on Sustainable Consumption and Production (SCP) are all requesting efforts to alleviate these drawbacks.

The overall objective is to achieve radical improvements in both the competitiveness and the environmental performance of energy intensive industries (e.g. non-ferrous metals, pulp and paper, cement, glass and ceramics industries - as this call is a part of a multi-annual strategy, the chemical, petrochemical and/or iron and steel sectors are not addressed specifically to avoid overlaps with running activities covered by specific calls) by developing more cost efficient and eco efficient processes and technologies in a multi-sectoral context. Health and safety issues related to the new process should be addressed.

The developed new processes will not necessarily produce the same materials/products as the conventional processes. Research is needed not only in the development of these new processes but also in the development of the new materials that they will produce.

Technical content/scope: The research should aim at developing new more cost and energy efficient routes and technologies for eco-efficient products contributing to the CO₂ reduction goal with:

- new or modified reactors and furnace design,
- use of less energy intensive or recycled materials as feedstock,
- use of renewable and alternative energy resources, like bio-based resources and secondary materials,
- the technical scope includes the development and optimisation of materials and the use of these based on understanding of micro/nano scale processes,
- heat, water and other media recovery, as well as advanced solid, liquid and gaseous waste management,
- better process control

Funding scheme: Large-scale integrating Collaborative Projects.

Specific features: In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners, a clear industrial leadership and a multisectoral approach to CO₂ abatement represent an added value to the activities and this will be reflected in the evaluation. Large-scale demonstration of the new processes and materials is needed to increase the exploitation potential.

Expected Impact: New cost-efficient technologies and processes will target:

- energy efficiency increase higher than 20%,
- reduction of emissions of CO₂ and other greenhouse Gases (GHG) higher than 20%,
- feedstock savings higher than 20%,
- operating cost reduction of at least 10%,
- productivity increase of at least 10%.

NMP-2009-4.0-5 Innovative and knowledge-based tooling industry

Technical content/scope: Innovation, technological development and optimisation of the overall manufacturing system strongly depends on innovations and developments in moulds, dies and tools. Having interfaces to the final parts (products and components) and production equipment (such as, machine-tools), the tool is in the core of the production system, determining its efficiency and robustness. Their cost and time-to-customers as well as their quality and reliability are key competitive factors which, directly or indirectly, have a structural and horizontal strategic effect in the sustainability of the European industrial competitiveness. The topic focuses on creating the foundations for knowledge-based engineering capacity in the European tooling industry, based on in-depth understanding of the tooling engineering requirements and driven by application-oriented failure modes, end-of life assessment and added value product manufacturing.

Research results should include:

- new organisational models, including distributed engineering and manufacturing systems and ad hoc business models, for shortening time-to-customers, being more cost effective and providing added-value services to the developing holistic and integrated European manufacturing approach;
- enhancement of virtual and numerical based simulation aid as an essential resource in the product development phase to ensure capability and robustness of manufacturing processes to reduce amount of down-time;
- development of digital mould and die design, production and verification processes, coupled with innovative tailored solutions using new functional materials, innovative manufacturing and quality control approaches and advanced surface finishing engineering for optimised operational parameters;
- integration of safety at the design stage, aiming at inherent safety and minimisation of impacts on workers and the environment.

Industrial sectors to be targeted range from manufacturing of micro-applications to large devices and from “one-of-a-kind” and small series to large scale and massive production.

Funding scheme: SME-targeted Collaborative Projects.

Specific features: SME dedicated Collaborative Projects are specifically designed to encourage SME participation in research and innovation representing the complete value added of the targeted sectors. In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation. In order to ensure an efficient implementation and maximum impact of SME-related activities, the following aspects will be evaluated under the criteria 'Implementation' and 'Impact':

- the leading role of SMEs with R&D capacities-: the coordinator does not need to be an SME but the participating SMEs should have the decision making power in the project management and the output should be for the benefit of the participating SMEs and the targeted SME dominated industrial communities, and;

- level of SME involvement: In addition to the evaluation criteria, please note that only proposals with an SME involvement of the order of 35% or more of the requested EC contribution will be selected.

The following specific requirements will be reflected in the evaluation: (i) proposals are expected to include significant demonstration elements; (ii) apart from the technical developments, the proposal Impact assessment will consider the contribution towards new business models, networking and technological partnerships for extended services throughout the tools' useful life.

Expected impact: Intensive R&D in specific fields of tooling-making processes has a direct effect on the sector itself, promoting its migration from a resource based industry to a knowledge-intensive engineering service provider, and a multiplying effect as an enabler for the development, innovation and sustainability of the European manufacturing industry as a whole. The impact of the development should be measured with regard to both advanced engineering capacity (increasing investment research & development activities within the SMEs by 10-15%, increasing number of partnerships between industries and universities/research institutes by 15-20%) and business performance (stable or up to 5% increasing employment potential, stable growth of the world market sales share, recognised world leadership in 5-10 well-identified advanced technological sectors) in the tooling industry in Europe.

NMP-2009-4.0-6 Organisation of NMP events related to the Presidencies of the European Union

Technical content/scope: An integral part of the NMP Theme's activity is to organise, together with successive EU presidencies, events of a strategic nature. The proposed Support Action(s) should contribute to new EuroNanoForum (ENF) conferences or other appropriate new events to be held in a Member State which will hold a forthcoming Presidency of the European Union, specifically Spain, Belgium, Hungary or Poland. In order to ensure high political and strategic relevance, the active involvement of the competent National Authority(ies) will be evaluated under criteria 'Quality' and 'Impact'. The proposed Support Action(s) should address topics that are of high relevance at the date of its taking place. An appropriate equilibrium should be present in the proposed action(s), with balanced presentation of various research and industrial elements and points of view. Participation of non-EU actors is possible. Outreach activities may be included such as e.g. a press programme and/or an event dedicated to schools. One Support Action can address the organisation of a dedicated NMP event; this event does not necessarily have to be organised in/by a country holding the EU Presidency, but may well be coordinated with an ENF edition.

Funding scheme: Coordination and Support Actions (supporting action).

Specific features: None.

Expected impact: (i) Review of research, industrial and/or societal developments linked to the nanotechnology and/or the NMP areas, as appropriate; (ii) sharing of information and comparison of points of views; (iii) support to the activity of various stakeholders: natural scientists, social scientists, ethicists, researchers, industrialists, investors, museums and/or schools.

NMP-2009-4.0-7 ERA-Net on high value added textiles and fibre-based materials

Technical content/scope: The ERA-Net on high value added textiles and other fibre-based advanced materials aims at stepping up coordination of research programmes in the field of fibres and textiles which are increasingly used as the material of choice in a broad range of high added value product applications and markets. A step towards this aim is identifying RTD priorities in view of implementing joint initiatives, including joint calls.

Funding scheme: Coordination and Support Actions.

Specific features: See Annex 4. Only ERA-Net eligible partners can participate. The minimum number of participants is set at three independent legal entities managing publicly funded national or regional programmes, each of which is established in a Member or Associated state. The Europe-wide character will be reflected in the evaluation.

Expected impact: This activity is expected to improve cooperation and set the basis for long-lasting cooperation in the field; to address in a coordinated way issues of common interests, by targeting high growth global markets for high value added textiles and fibre- based materials (such as applications for personal protection, healthcare and sports, construction, transport systems, agriculture, energy, packaging and industrial equipment); to capitalise the experience of joint calls and coordinated activities with a view to setting up a transnational European programme in the field, by for example the preparation of an ERA-Net Plus.

III Implementation of calls in 2009
III.1 Budget (Million EUR): 2008 calls (drawing on 2009 budget)

		2009*
2nd Calls	Large-scale integrating Collaborative Projects	150.015
	Small or medium-scale focused research projects	63.414
	SME-targeted Collaborative Projects	47.896
	ERANET	4.000
	ERANET Plus **	6.000
	TOTAL	271.325

** ERANET Plus implemented via a joint call as detailed in Annex 4.

III.2 Indicative budget (Million EUR): Third calls 2009

		2009	2010*
3rd calls	Joint call Biorefinery	7.000	
	Large-scale integrating Collaborative Projects	71.704	53.296
	Small or medium-scale focused research projects	45.000	35.000
	SME-targeted Collaborative Projects	15.000	10.000
	CSA (Coordination and Support Actions)	5.000	
	Joint call Environment	5.000	
	Coordinated call Russia	4.650	
	Mapping research infrastructure call	0.350	
	ERANET **	1.500	
		Total	155.204
Other activities	- Evaluation (1.940) - Calls for tenders (1.875)	3.815	
General Activities	- Cordis (1.336) - Eureka/Research organisations (0.041)		

(see Annex 4)	- Cost (3.744) -ERANET (0.023)	5.144	
TOTAL		164.163	

*** As provided in the 2010 work programme concerning the Specific Programme 'Cooperation'.*

***ERANET projects are implemented via a joint call as detailed in Annex 4.*

All budgetary figures given in this work programme are indicative. Following the evaluation of proposals the final budget awarded to actions implemented through calls for proposals may vary by up to 10% of the total value of the indicated budget for each call.

The final budgets for evaluation, monitoring and review may vary by up to 20% of the indicated budgets for these actions. The final budget awarded for actions not implemented through calls for proposals may vary by up to 10% of the indicated budgets for these actions.

III.3 Calls for proposals NMP-2009

Call Title: Theme 4 – NMP - Nanosciences, Nanotechnologies, Materials and new Production Technologies – LARGE

- **Call identifier:** *FP7-NMP-2009-LARGE-3*
- **Date of publication**⁶: 19 November 2008
- **Deadline**⁷: For Large-scale integrating Collaborative Projects - first stage: 17 February 2009 at 17.00.00 (Brussels local time)
- **Indicative budget**⁸: EUR 125 million⁹ (EUR 71.704 million in 2009 and 53.296 in 2010).
- **Topics called:**

Activity/ Area	Topics called	Funding Schemes
Knowledge-based smart materials with tailored properties	NMP-2009-2.2-1 Oxide materials for electronics applications	<i>Large-scale integrating Collaborative Projects</i>
Using engineering to develop high performance knowledge-based materials	NMP-2009-2.5-1 Light high-performance composites	
Adaptive production systems	NMP-2009-3.2-1 Innovative pathways for sustainable chemical production	
Rapid transfer and integration of new technologies into the design and operation of manufacturing processes	NMP-2009-3.4-1 Automation and robotics for sustainable crop and forestry management	
Integration of technologies for industrial applications	NMP-2009-4.0-3 Development of nanotechnology-based systems for molecular diagnostics and imaging	
	NMP-2009-4.0-4 Reducing the environmental footprint of energy intensive industries	

- **Eligibility conditions:** The minimum number of participating legal entities for all funding schemes is set out in the Rules for Participation. For large scale integrating Collaborative Projects the minimum conditions to participate are: at least 3 independent legal entities, each of which is established in a MS or AC and no 2 of which are established in the same MS or AC.

⁶ The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication.

⁷ At the time of the publication of the call, the Director-General responsible may delay this deadline by up to two months.

⁸ The budget for this call is indicative. The final total budget awarded to this call, following the evaluation of projects, may vary by up to 10% of the total value of the call.

⁹ Under the condition that the preliminary draft budget for 2010 is adopted without modifications by the budgetary authority.

In addition to the general eligibility criteria, which are given in Annex 2 of the work programme, for large scale integrating projects the minimum EC funding requested **must be greater than EUR 4 million**.

Please note that the financial resources mobilised within a project will be assessed during the evaluation against the real work to be carried out in the project.

- **Evaluation procedure:** For Large scale integrating Collaborative Projects the evaluation shall follow a two-stage procedure. The first stage proposal, of a maximum of 10 pages (font size 12) should focus on the S&T content and on clear identification of the intended results, their intended use and the expected impact (economic, social, environmental, etc.) and 2 additional pages to describe the consortium and the estimated financial resources involved. It will be evaluated on the basis of two evaluation criteria, i.e.: *scientific quality and expected impact*. Stage 1 proposals will be evaluated remotely. Stage 1 proposals shall be submitted at the closure date mentioned above. Coordinators of retained proposals in stage 1 ('go' proposals) will be invited to submit a complete proposal that will be then evaluated against the entire set of evaluation criteria. The closure date of the second submission will be specified in the invitation to submit the complete proposal. The indicative closure date is: 22 July 2009.

In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation.

For this call, implemented via a two stage procedure, the following criteria and thresholds are applied:

- Evaluation criteria and thresholds for stage 1 proposals:

Stage 1 proposals are evaluated on the basis of the following two criteria: **S/T quality and Impact**. For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	4/5
Impact	3/5
Overall threshold required	8/10

- Evaluation criteria and thresholds for stage 2 proposals:

Stage 2 proposals are evaluated on the basis of the following three criteria: **1. S/T quality; 2. Implementation; 3. Impact**. For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	4/5
Implementation	3/5
Impact	4/5
Overall threshold required	12/15

See also Annex 2: Eligibility and evaluation criteria for proposals.

In contrast with Annex 2, at Panel stage, the priority order of the proposals with equal overall scores will be established in accordance with their scores for the S/T Quality criterion. If they are still tied, they will be prioritised according to their scores for the Impact criterion. If proposals are still tied, they will be prioritised on the basis of the work programme coverage.

- **Indicative evaluation and contractual timetable:** Evaluation Stage 1 proposals: March 2009; Evaluation stage 2 proposals: September 2009. Evaluation results: estimated to be available within two months after the closure date. A reserve list of projects might be established.
- **Consortia agreements:** Participants are required to conclude a consortium agreement.
- **Forms of grant and maximum reimbursement rates** for projects funded through the Cooperation work programme are given in Annex 3 of this work programme.

Call Title: Theme 4 – NMP - Nanosciences, Nanotechnologies, Materials and new Production Technologies - SMALL

- **Call identifier:** *FP7-NMP-2009-SMALL-3*
- **Date of publication**¹⁰: 19 November 2008
- **Deadline**¹¹: For *Small or medium-scale focused research projects* - first stage: 17 February 2009 at 17.00.00 (Brussels local time)
- **Indicative budget**¹²: **EUR 80 million**¹³ (**EUR 45.000 million in 2009 and 35.000 in 2010**).
- **Topics called:**

Activity/ Area	Topics called	Funding Schemes
Nanosciences and converging sciences	NMP-2009-1.1-1 Nanobiotechnology: Applying life science principles as model for new nanotechnology-based mechanisms, processes, devices and/or systems	<i>Small or medium-scale focused research projects</i>
Nanotechnologies and converging technologies	NMP-2009-1.2-1 Nanotechnology for harvesting energy via photovoltaic technologies	
	NMP-2009-1.2-2 Molecular factory: manufacturing objects with predictable and controllable properties	
Mastering nano-scale complexity in materials	NMP-2009-2.1-1 Nano-structured materials based on graphene	
Novel material and bio-inspired materials	NMP-2009-2.3-1 Biomimetic gels and polymers for tissue repair	
Coordinated activities and international cooperation	NMP-2009-2.6-1 Novel membranes for water technologies (SICA)	
Adaptive production systems	NMP-2009-3.2-2 Adaptive control systems for responsive factories	

- **Eligibility conditions:** The minimum number of participating legal entities for all funding schemes is set out in the Rules for Participation. For Small or medium scale focused research projects the minimum conditions to participate are: at least 3 independent legal entities, each of which is established in a MS or AC and no 2 of which are established in the same MS or AC.

In addition to the general eligibility criteria, which are given in Annex 2 of the work programme, for the Small or medium scale focused research projects, which require typically an

¹⁰ The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication.

¹¹ At the time of the publication of the call, the Director-General responsible may delay this deadline by up to two months.

¹² The budget for this call is indicative. The final total budget awarded to this call, following the evaluation of projects, may vary by up to 10% of the total value of the call.

¹³ Under the condition that the preliminary draft budget for 2010 is adopted without modifications by the budgetary authority.

EC contribution of EUR 1 to 3 million, the **maximum** EC funding requested **must not exceed EUR 4 million**.

Please note that the financial resources mobilised within a project will be assessed during the evaluation against the real work to be carried out in the project.

The following topic has specific eligibility criteria:

- **NMP-2009-4.2.6-1 Novel membranes for water technologies:** it is a Specific International Co-operation Action (SICA) targeted to African and/or Mediterranean countries, for which the minimum participation is of at least 4 independent legal entities. Of these, two must be established in different Member States or Associated Countries and the other two must be established in different targeted regions/countries.

- **Evaluation procedure:** For Small or medium-scale focused research projects the evaluation shall follow a two-stage procedure. The first stage proposal, of a maximum of 10 pages (font size 12) should focus on the S&T content and on clear identification of the intended results, their intended use and the expected impact (economic, social, environmental, etc.) and 2 additional pages to describe the consortium and the estimated financial resources involved. It will be evaluated on the basis of two evaluation criteria, i.e.: *scientific quality and expected impact*. Stage 1 proposals will be evaluated remotely. Stage 1 proposals shall be submitted at the closure date mentioned above. Coordinators of retained proposals in stage 1 ('go' proposals) will be invited to submit a complete proposal that will be then evaluated against the entire set of evaluation criteria. The closure date of the second submission will be specified in the invitation to submit the complete proposal. The indicative closure date is: 22 July 2009.

In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation.

For this call, implemented via a two stage procedure, the following criteria and thresholds are applied:

- **Evaluation criteria and thresholds for stage 1 proposals:**

Stage 1 proposals are evaluated on the basis of the following two criteria: **S/T quality and Impact**. For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	4/5
Impact	3/5
Overall threshold required	8/10

- **Evaluation criteria and thresholds for stage 2 proposals:**

Stage 2 proposals are evaluated on the basis of the following three criteria: **1. S/T quality; 2. Implementation; 3. Impact**. For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	4/5
Implementation	3/5
Impact	3/5
Overall threshold required	12/15

See also Annex 2: Eligibility and evaluation criteria for proposals.

In contrast with Annex 2, at Panel stage, the priority order of the proposals with equal overall scores will be established in accordance with their scores for the S/T Quality criterion. If they are still tied, they will be prioritised according to their scores for the Impact criterion. If proposals are still tied, they will be prioritised on the basis of the work programme coverage.

- **Additional selection criterion**

The following topic has a specific selection criterion:

NMP-2009-1.1-1 Nanobiotechnology: Applying life science principles as model for new nanotechnology-based mechanisms, processes, devices and/or systems: In order to avoid overlapping with Theme 2 activities, proposals covering the following research areas will not be selected under Theme 4 – NMP: smart nano-biotechnology devices to study biomolecule dynamics in real time, nanobiotechnology for functionalised membranes, bio-interfaces for environmental applications, analysis of the ethical, safety, regulatory and socioeconomic aspects of nano-biotechnology (excluding nanomedicine), as well as analytical tools for the characteristic of nano-particles in the food matrix.

- **Indicative evaluation and contractual timetable:** Evaluation Stage 1 proposals: March/ 2009; Evaluation stage 2 proposals: September 2009. Evaluation results: estimated to be available within two months after the closure date. A reserve list of projects might be established.
- **Consortia agreements:** Participants are required to conclude a consortium agreement.
- **Forms of grant and maximum reimbursement rates** for projects funded through the Cooperation work programme are given in Annex 3 of this work programme.

Call Title: Theme 4 – NMP - Nanosciences, Nanotechnologies, Materials and new Production Technologies - SMEs

- **Call identifier:** *FP7-NMP-2009-SME-3*
 - **Date of publication**¹⁴: 19 November 2008
 - **Deadline**¹⁵: For SME-targeted Collaborative Projects - first stage: 17 February 2009 at 17.00.00 (Brussels local time)
 - **Indicative budget**¹⁶: **EUR 25 million**¹⁷ (EUR 15.000 million in 2009 and 10.000 in 2010).
- Topics called:**

Activity/ Area	Topics called	Funding Schemes
Advances in chemical technologies and materials processing	NMP-2009-2.4-1 New biomass-based composite materials and their processing	SME-targeted Collaborative Projects
Rapid transfer and integration of new technologies into the design and operation of manufacturing processes	NMP-2009-3.4-2 Holistic and integrated approach to high performance, reliable and adaptive machine tool design and production	
Integration of technologies for industrial applications	NMP-2009-4.0-5 Innovative and knowledge-based tooling industry	

- **Eligibility conditions:** The minimum number of participating legal entities for all funding schemes is set out in the Rules for Participation. For Small or medium scale focused research projects the minimum conditions to participate are: at least 3 independent legal entities, each of which is established in a MS or AC and no 2 of which are established in the same MS or AC.

The general eligibility criteria are given in Annex 2 of the work programme. For SME targeted projects **no upper or lower limits** in EC contribution are applied.

Please note that the financial resources mobilised within a project will be assessed during the evaluation against the real work to be carried out in the project.

- **Evaluation procedure:** For SME targeted projects the evaluation shall follow a two-stage procedure. The first stage proposal, of a maximum of 10 pages (font size 12) should focus on the S&T content and on clear identification of the intended results, their intended use and the expected impact (economic, social, environmental, etc.) and 2 additional pages to describe the consortium and the estimated financial resources involved. It will be evaluated on the basis of two evaluation criteria, i.e.: *scientific quality and expected impact*. Stage 1 proposals will be evaluated remotely. Stage 1 proposals shall be submitted at the closure date mentioned above. Coordinators of retained proposals in stage 1 ('go' proposals) will be invited to submit a complete proposal that will be then evaluated against the entire set of evaluation criteria. The closure date of the second submission will be specified in the invitation to submit the complete proposal. The indicative closure date is: 22 July 2009.

¹⁴ The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication.

¹⁵ At the time of the publication of the call, the Director-General responsible may delay this deadline by up to two months.

¹⁶ The budget for this call is indicative. The final total budget awarded to this call, following the evaluation of projects, may vary by up to 10% of the total value of the call.

¹⁷ Under the condition that the preliminary draft budget for 2010 is adopted without modifications by the budgetary authority.

In order to ensure an efficient implementation and maximum impact of SME-related activities, the following aspects will be evaluated under the criteria 'Implementation' and 'Impact':

- the leading role of SMEs with R&D capacities: the coordinator does not need to be an SME but the participating SMEs should have the decision making power in the project management and the output should be for the benefit of the participating SMEs and the targeted SME dominated industrial communities, and;

- level of SME involvement. Please take note of the additional selection criterion below.

In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation.

For this call, implemented via a two stage procedure, the following criteria and thresholds are applied:

- Evaluation criteria and thresholds for stage 1 proposals:

Stage 1 proposals are evaluated on the basis of the following two criteria: **S/T quality and Impact**. For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	4/5
Impact	3/5
Overall threshold required	8/10

- Evaluation criteria and thresholds for stage 2 proposals:

Stage 2 proposals are evaluated on the basis of the following three criteria: **1. S/T quality; 2. Implementation; 3. Impact**. For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	4/5
Implementation	3/5
Impact	3/5
Overall threshold required	12/15

See also Annex 2: Eligibility and evaluation criteria for proposals

In contrast with Annex 2, at Panel stage, the priority order of the proposals with equal overall scores will be established in accordance with their scores for the S/T Quality criterion. If they are still tied, they will be prioritised according to their scores for the Impact criterion. If proposals are still tied, they will be prioritised on the basis of the work programme coverage.

• **Additional selection criterion**

SME-targeted Collaborative Projects will only be selected on the condition that the SME involvement is of the order of 35% or more of the requested EC contribution.

- **Indicative evaluation and contractual timetable:** Evaluation Stage 1 proposals: March 2009; Evaluation stage 2 proposals September 2009. Evaluation results: estimated to be available within two months after the closure date. A reserve list of projects might be established.
- **Consortia agreements:** Participants are required to conclude a consortium agreement.
- **Forms of grant and maximum reimbursement rates** for projects funded through the Cooperation work programme are given in Annex 3.

Call Title: Theme 4 – NMP - Nanosciences, Nanotechnologies, Materials and new Production Technologies – CSAs

- **Call identifier:** *FP7-NMP-2009-CSA-3*
- **Date of publication**¹⁸: 19 November 2008
- **Deadline**¹⁹: For Coordination and Support Actions: 31 March 2009 at 17.00.00 (Brussels local time)
- **Indicative budget**²⁰: **EUR 5 million** ²¹.

Please note that the financial resources mobilised within a project will be assessed during the evaluation against the real work to be carried out in the project.

- **Topics called:**

Activity/ Area	Topics called	Funding Schemes
Nanotechnologies and converging technologies	NMP-2009-1.2-5 Best practices to lower the barriers for commercialisation of nanotechnology research	<i>Coordination and support actions (supporting action)</i>
Health, Safety and Environmental Impacts	NMP-2009-1.3-2 Exposure scenarios to nanoparticles	
Integration of technologies for industrial applications	NMP-2009-4.0-6 Organisation of NMP events related to the Presidencies of the European Union	

- **Eligibility conditions:** The minimum number of participating legal entities for all funding schemes is set out in the Rules for Participation.

Funding scheme	Minimum conditions
Coordination and Support Actions (supporting action)	At least 1 independent legal entity.

See also Annex 2: Eligibility and evaluation criteria for proposals

In contrast with Annex 2, at Panel stage, the priority order of the proposals with equal overall scores will be established in accordance with their scores for the S/T Quality criterion. If they are still tied, they will be prioritised according to their scores for the Impact criterion. If proposals are still tied, they will be prioritised on the basis of the work programme coverage.

- **Evaluation procedure:** For Coordination and Support Actions the evaluation shall follow a single stage procedure.

¹⁸ The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication.

¹⁹ At the time of the publication of the call, the Director-General responsible may delay this deadline by up to two months.

²⁰ The budget for this call is indicative. The final total budget awarded to this call, following the evaluation of projects, may vary by up to 10% of the total value of the call.

²¹ Under the condition that the preliminary draft budget for 2010 is adopted without modifications by the budgetary authority.

- **Indicative evaluation and contractual timetable:** Evaluation: End May. Evaluation results: estimated to be available within two months after the closure date. A reserve list of projects might be established.
- **Consortia agreements:** Participants are encouraged but not required to conclude a consortium agreement.
- **Forms of grant and maximum reimbursement rates** for projects funded through the Cooperation work programme are given in Annex 3 of this work programme.

Call Title: Theme 4 – NMP - Nanosciences, Nanotechnologies, Materials and new Production Technologies – EU-Russia

- **Call identifier:** *FP7-NMP-2009-EU-Russia*
- **Date of publication:**²² 19 November 2008
Deadline²³: For Collaborative Projects - Small or medium-scale focused research projects– 31 March 2009 at 17.00.00 (Brussels local time).
- **Indicative budget**²⁴: **EUR 4.650 million** ²⁵ by EC- NMP Theme (a similar budget for the call is expected from the Ministry of Education and Science of Russia, in particular, its Federal Agency for Science and Innovation (Rosnauka).
- **Topic called:**

Topic called	Topics	Funding Scheme
NMP-2009-1.2-3 Nanotechnologies – coordinated calls with Russia	<i>A. Optical chemical sensing with nanoparticles, nano-waveguides and photonic structures.</i>	Small or medium scale focused research projects
	<i>B. Wireless Surface Acoustic Wave Physical Sensors for operation in a wide temperature range.</i>	
	<i>C. Sensing of toxic and explosive agents in air based on metal oxide semiconductor nano-structured materials.</i>	

- **Eligibility conditions:** The minimum number of participating legal entities for all funding schemes is set out in the Rules for Participation. The eligibility, selection and award criteria to be applied to this coordinated call are given in Annex 2 of this work programme. Proposals which do not include coordination with a Russian project will be considered ineligible. Therefore, the EC project proposals must include detailed explanations about the proposal to be financed by the Russian Federal Agency for Science and Innovation (Rosnauka). Proposals will only be evaluated on the condition that the proposal related to their coordinated Russian project has also been presented for funding to the Russian Federal Agency for Science and Innovation (Rosnauka).
 - In addition, for each Small or medium scale focused research project, the maximum EC funding requested must not exceed **EUR 1.550 million**.
 - Please note that the financial resources mobilised within a project will be assessed during the evaluation against the real work to be carried out in the project.

²² The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication.

²³ At the time of the publication of the call, the Director-General responsible may delay this deadline by up to two months.

²⁴ The budget for this call is indicative. The final total budget awarded to this call, following the evaluation of projects, may vary by up to 10% of the total value of the call.

²⁵ Under the condition that the preliminary draft budget for 2010 is adopted without modifications by the budgetary authority.

- **Evaluation procedure**

– For this call the evaluation shall follow a single-stage evaluation procedure. The proposals will be evaluated by a panel including both European and Russian experts.

– **Evaluation criteria and thresholds**

The evaluation criteria and subcriteria to be applied to this coordinated call are given in Annex 2 of this work programme.

Proposals are evaluated on the basis of the following three criteria: **1. S/T quality; 2. Implementation; 3. Impact.** For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	3/5
Implementation	3/5
Impact	3/5
Overall threshold required	10/15

In order to ensure a more genuine EU-Russia cooperation, a balanced effort between the two coordinated projects and research plan properly involving coordinated research activities between Europe and Russia, represent an added value to the activities and this will be reflected in the evaluation under the criteria 'Impact' and 'Implementation'.

In terms of reciprocity, non confidential abstracts of EC retained proposals will be made available to the Russian authority.

See also Annex 2: Eligibility and evaluation criteria for proposals

In contrast with Annex 2, at Panel stage, the priority order of the proposals with equal overall scores will be established in accordance with their scores for the S/T Quality criterion. If they are still tied, they will be prioritised according to their scores for the Impact criterion. If proposals are still tied, they will be prioritised on the basis of the work programme coverage.

- **Additional selection criterion**

Proposals will only be selected on the condition that their coordinated Russian project will be funded by the Russian Federal Agency for Science and Innovation (Rosnauka).

Only one proposal per topic will be funded under this call: that is one proposal for each one of the three topics (A, B, C) implemented via Small or medium scale focused research projects.

- **Indicative evaluation and contractual timetable**

Evaluation: Beginning of May 2009; Evaluation results: estimated to be available within two months after the closure date. A reserve list of projects might be established. Negotiations will be carried out in parallel by the EC and the Russian Federal Agency for Science and Innovation (Rosnauka), in order to have a simultaneous start of the respective grant agreements.

- **Consortia and coordination agreements**

Participants are requested to conclude a consortium agreement. In addition, participants in the EC Collaborative Projects are required to conclude a coordination agreement with the participants in the coordinated project funded by the Russian Federal Agency for Science and Innovation

(Rosnauka). A final draft of these agreements has to be provided with the proposal. Forms of grant and maximum reimbursement rates for projects funded through the Cooperation work programme are given in Annex 3 of this work programme.

Call Title: Theme 4 – NMP - Nanosciences, Nanotechnologies, Materials and new Production Technologies - Mapping

- **Call identifier:** *FP7-NMP-2009-Mapping*

- **Date of publication:**²⁶ 19 November 2008

Deadline²⁷: For Coordination and Support Actions – 31 March 2009 at 17.00.00 (Brussels local time).

- **Indicative budget**²⁸: **EUR 350 000**²⁹

- **Topic called:**

Topic called	Topics	Funding Scheme
	<i>NMP-2009-1.2-4 Mapping of nanotechnology and nanostructured materials research infrastructures in Russia</i>	Coordination and Support actions (supporting action)

- **Eligibility conditions:** The minimum conditions shall be at least two participants, one of which established in Member States or associated countries and the other one in Russia.

The maximum EC funding requested must not exceed **EUR 350 000**.

Please note that the financial resources mobilised within a project will be assessed during the evaluation against the real work to be carried out in the project.

- **Evaluation procedure**

For this call the evaluation shall follow a single-stage evaluation procedure. The proposals will be evaluated by a panel including both European and Russian experts.

- **Evaluation criteria and thresholds**

The evaluation criteria and subcriteria to be applied to this coordinated call are given in Annex 2 of this work programme.

For Coordination and Support Actions aiming at supporting research activities the proposals are evaluated on the basis of the following three criteria: **1. S/T quality; 2. Implementation; 3. Impact**. For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	3/5
Implementation	3/5

²⁶ The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication.

²⁷ At the time of the publication of the call, the Director-General responsible may delay this deadline by up to two months.

²⁸ The budget for this call is indicative. The final total budget awarded to this call, following the evaluation of projects, may vary by up to 10% of the total value of the call.

²⁹ Under the condition that the preliminary draft budget for 2010 is adopted without modifications by the budgetary authority.

Impact	3/5
Overall threshold required	10/15

See also Annex 2: Eligibility and evaluation criteria for proposals

In contrast with Annex 2, at Panel stage, the priority order of the proposals with equal overall scores will be established in accordance with their scores for the S/T Quality criterion. If they are still tied, they will be prioritised according to their scores for the Impact criterion. If proposals are still tied, they will be prioritised on the basis of the work programme coverage.

Only one proposal will be funded under this call.

- **Indicative evaluation and contractual timetable**

Evaluation: Beginning of May 2009; Evaluation results: estimated to be available within two months after the closure date.

- **Consortia agreements**

Participants are encouraged but not required to conclude a consortium agreement.

- Forms of grant and maximum reimbursement rates for projects funded through the Cooperation work programme are given in Annex 3 of this work programme.

- **Call Title:** Theme 4 – NMP - Nanosciences, Nanotechnologies, Materials and new Production Technologies and Theme ENVIRONMENT (including Climate Change)
- **Call identifier:** FP7-NMP-ENV-2009
- **Date of publication**³⁰: 19 November 2008
- **Deadline**³¹: 31 March 2009- at 17.00.00 (Brussels local time)
- **Indicative budget**³²: 10 million EUR of which EUR 5 million from Theme 4 – NMP³³ and EUR 5 million from Theme 6 – Environment (including Climate Change).
- **Topic called**

THEME/ACTIVITY	TOPIC IDENTIFIER	FUNDING SCHEME
ENV.2009.3.1.3.2	Activities towards the development of appropriate solutions for the use, recycling and/or final treatment of nanotechnology-based products	<i>Collaborative projects</i>
<i>NMP-2009-1.3-1</i>		

This topic is implemented jointly with Theme 6 – Environment (including Climate Change), hence each proposal must be submitted only **once**, either to topic NMP-2009-1.3-1 or to topic ENV.2009.3.1.3.2, **but not to both**.

- **Eligibility conditions:** The minimum number of participating legal entities for all funding schemes is set out in the Rules for Participation. For Small or medium scale focused research projects the minimum conditions to participate are: at least 3 independent legal entities, each of which is established in a MS or AC and no 2 of which are established in the same MS or AC.

In addition to the general eligibility criteria, which are given in Annex 2 of the work programme, for the Small or medium scale focused research projects, the **maximum** EC funding requested **must not exceed EUR 2.5 million**.

Please note that the financial resources mobilised within a project will be assessed during the evaluation against the real work to be carried out in the project.

- **Evaluation procedure:**

A single-stage submission procedure will be followed. Proposals may be evaluated remotely.

The evaluation criteria (including thresholds) and sub-criteria together with the eligibility, selection and aware criteria for the different funding schemes are set out in annex 2 to this work programme.

In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation.

See also Annex 2: Eligibility and evaluation criteria for proposals

In contrast with Annex 2, at Panel stage, the priority order of the proposals with equal overall scores will be established in accordance with their scores for the S/T Quality criterion. If they are still tied,

³⁰ The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication.

³¹ At the time of the publication of the call, the Director-General responsible may delay this deadline by up to two months.

³² The budget for this call is indicative. The final total budget awarded to this call, following the evaluation of projects, may vary by up to 10% of the total value of the call.

³³ Under the condition that the preliminary draft budget for 2010 is adopted without modifications by the budgetary authority.

they will be prioritised according to their scores for the Impact criterion. If proposals are still tied, they will be prioritised on the basis of the work programme coverage.

- **Indicative evaluation and contractual timetable:**

Evaluations are expected to be carried out during the months of April 2009. It is expected that the contract negotiations for the short-listed proposals will be opened in June 2009.

- **Consortia agreements:** Participants are required to conclude a consortium agreement.
- The forms of grants and maximum reimbursement rates which will be offered are specified in Annex 3 to the Cooperation work programme.

Call title: BIOREFINERY Joint Call

Call identifier: FP7-2009-BIOREFINERY

Date of publication: 3 September 2008

Deadline: 2 December 2008 at 17.00.00, Brussels local time

Indicative budget ^{34,35}: EUR 57 million of which:

- EUR 10 million from Theme 2 – Food, Agriculture and fisheries, biotechnology (KBBE)
- EUR 7 million from Theme 4 – Nanosciences, nanotechnologies, materials and new production technologies (NMP)
- EUR 30 million from Theme 5 – Energy
- EUR 10 million from Theme 6 - Environment.

The final budget awarded to this call, following the evaluation of projects, may vary by up to 10% of the total value of the call.

Topics called:

The Biorefinery topics are evaluated and implemented jointly by the Themes 2, 4, 5, 6 mentioned above. They are identical in each theme. When applying for this call please use one of the activity codes below. Each proposal should be submitted only once.

Activity/ Area	Topics called	Funding Schemes
ACTIVITY KBBE 3: LIFE SCIENCES, BIOTECHNOLOGY AND BIOCHEMISTRY FOR SUSTAINABLE NON-FOOD PRODUCTS AND PROCESSES		
KBBE-2009-3-7-01	Sustainable Biorefineries	Collaborative Project
KBBE-2009-3-7-02	Enhancing exchange of information, synergies and cross-fertilisation between projects in the field of Biorefineries	Coordination and Support Action (coordinating action)
ACTIVITY NMP 4: INTEGRATION OF TECHNOLOGIES FOR INDUSTRIAL APPLICATIONS		
NMP-2009-4.0-1	Sustainable Biorefineries	Collaborative Project
NMP-2009-4.0-2	Enhancing exchange of information, synergies and cross-fertilisation between projects in the field of Biorefineries	Coordination and Support Action (coordinating action)
ACTIVITY ENERGY 3: RENEWABLE FUEL PRODUCTION		
ENERGY.2009.3.3.1	Sustainable Biorefineries	Collaborative Project
ENERGY.2009.3.3.2	Enhancing exchange of information, synergies and cross-fertilisation between projects in the field of Biorefineries	Coordination and Support Action (coordinating action)

³⁴ A reserve list will be constituted if there are a sufficient number of good quality proposals. It will be used if extra budget becomes available.

³⁵ Under the condition that the preliminary draft budget for 2010 is adopted without modification by the budgetary authority.

ACTIVITY ENV 3: ENVIRONMENTAL TECHNOLOGIES		
ENV.2009.3.3.2.2	Sustainable Biorefineries	Collaborative Project
ENV.2009.3.3.2.3	Enhancing exchange of information, synergies and cross-fertilisation between projects in the field of Biorefineries	Coordination and Support Action (coordinating action)

Indicative Budget per topic

	Indicative Budget ³⁶
Sustainable Biorefineries	EUR 55 million
Enhancing exchange of information, synergies and cross-fertilisation between projects in the field of Biorefineries	EUR 2 million

In case the budget of EUR 2 million for the topic 'Enhancing exchange of information, synergies and cross-fertilisation between projects in the field of Biorefineries' cannot be consumed (totally or partially) the remaining budget will be returned to the topic 'Sustainable Biorefineries'.

Eligibility Conditions

The evaluation criteria, together with the eligibility, selection and award criteria, for the different funding schemes are set out in Annex 2 to this work programme

The minimum number of participating legal entities required, for all funding schemes, is set out in the Rules for Participation. They are summarised in the table below³⁷:

Funding scheme	Minimum conditions
Collaborative Project	At least 3 independent legal entities, each of which is established in a MS or AC, and no two of which are established in the same MS or AC.
Coordination and Support Action (coordination type)	At least 3 independent legal entities, each of which is established in a MS or AC, and no two of which are established in the same MS or AC.

Evaluation procedure:

- Proposals will not be evaluated anonymously.
- Proposals will be evaluated remotely with the consensus session being held in Brussels.
- The page limits that apply to proposals submitted under this call are given in the Guide for Applicants and in the proposal part B template available through the EPSS. The Commission will instruct the experts to disregard any pages in excess of these limits.

³⁶ A reserve list will be constituted if there are a sufficient number of good quality proposals. It will be used if extra budget becomes available.

³⁷ MS = Member States of the EU; AC = Associated country. Where the minimum conditions for an indirect action are satisfied by a number of legal entities, which together form one legal entity, the latter may be the sole participant, provided that it is established in a Member State or Associated country.

- At the Panel stage, proposals with equal overall scores will be prioritised according to their scores for the S/T Quality criterion. If they are still tied, they will be prioritised according to their scores for the Impact criterion.

TOPIC SUSTAINABLE BIOREFINERIES

The evaluation of the topic *Sustainable Biorefineries* shall follow a two-step procedure. The first stage proposals should focus on the S&T content and on clear identification of the intended results, their intended use and the expected impact (economic, social, environmental, etc.). Information on consortium composition and estimated financial resources involved should also be provided.

First stage proposals will be evaluated on the basis of their S/T Quality and Impact. Stage 1 proposals shall be submitted by the closure date mentioned above.

Coordinators of retained proposals in stage 1 ('go' proposals) will be invited to submit a complete proposal that will be then evaluated against the entire set of evaluation criteria. The closure date of the second submission will be specified in the invitation to submit the complete proposal. The indicative closure date is 05.05.2009.

Hearings may be organised.

Evaluation criteria and thresholds

Stage 1 proposals are evaluated on the basis of their **S/T quality** and **Impact**. For each criterion marks from 0 to 5 will be given, with the possibility of 0.5 point scores. Successful proposals must pass the minimum thresholds as follows:

STAGE 1	Minimum threshold
S/T quality	4/5
Impact	3/5
Overall threshold required	8/10

Stage 2 proposals are evaluated on the basis of the following three criteria: **1. S/T quality; 2. Implementation; 3. Impact**. For each criterion marks from 0 to 5 will be given, with the possibility of 0.5 point scores. Successful proposals must pass the minimum thresholds as follows:

STAGE 2	Minimum threshold
S/T quality	4/5
Implementation	3/5
Impact	4/5
Overall threshold required	12/15

Indicative Evaluation and contractual timetable

Evaluation stage 1 proposals: remote phase December 2008, consensus phase January 2009

Evaluation stage 2 proposals: remote phase May / June 2009, consensus phase June 2009.
Evaluation results: estimated to be available by the end of July 2009. A reserve list of projects might be established.

The following points will be reflected in the evaluation

The participation of relevant industrial partners, along with research organisations, SMEs, end-users and civil society organisations is essential to achieving the expected impact.

TOPIC ENHANCING EXCHANGE OF INFORMATION, SYNERGIES AND CROSS-FERTILISATION BETWEEN PROJECTS IN THE FIELD OF BIOREFINERIES

The evaluation of the topic Enhancing exchange of information, synergies and cross-fertilisation between projects in the field of Biorefineries shall follow a one step procedure. Proposals shall be submitted by the closure date mentioned above and evaluated against the entire set of evaluation criteria.

Evaluation criteria and thresholds

Proposals are evaluated on the basis of the following three criteria: **1. S/T quality; 2. Implementation; 3. Impact.** For each criterion marks from 0 to 5 will be given, with the possibility of 0.5 point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	3/5
Implementation	3/5
Impact	3/5
Overall threshold required	10/15

Indicative Evaluation and contractual timetable

Evaluations are expected to be carried out in December 2008 and January 2009 (Remote phase December 2008, consensus phase January 2009). It is expected that the contract negotiations for the short listed proposal will open by March 2009.

The following points will be reflected in the evaluation

The participation of relevant industrial partners is deemed as essential to achieving the expected impact.

POINTS RELEVANT TO BOTH TOPICS

Consortia agreements

Participants in Collaborative Projects are required to conclude a consortium agreement prior to grant agreement. Participants in Coordination and Support actions are encouraged, but not required, to conclude a consortium agreement.

The forms of grants and maximum reimbursement rates which will be offered are specified in Annex 3 to the Cooperation work programme

ERANET and ERANET Plus topics

The topic to be implemented via **ERANET** under Theme 4 – NMP - Nanosciences, Nanotechnologies, Materials and new Production Technologies is included in the single ERANET joint call and is described in Annex 4. This topic is shown below:

Activity/ Area	Topics called
ERA-NET	NMP-2009-4.0-7 ERANET on high value added textiles and fibre-based materials

IV OTHER ACTIONS³⁸

The funding of projects through the above schemes and the development of the programme will be supported by:

- the use of appointed **independent experts** for the evaluation of project proposals, as independent observers at these evaluations where appropriate, for the reviewing of running projects, and for focus groups (evaluation);

Funding scheme: CSA – expert contract

- **studies** into relevant future needs of industry and society, that is 'top down' studies to be implemented through public procurement;

Funding scheme: CSA – public procurement

- the use of **external assistance** (by 'Project Technical Assistants') to enable, if necessary, detailed, prompt, pro-active, and scientifically competent following of the projects by the Commission (to be implemented through public procurement);

Funding scheme: CSA – public procurement

- where appropriate, **Calls for Tender for public procurements**. The Commission will issue such as specific studies or services required to achieve the programme objectives, particularly with regard to the monitoring and assessment of the programme and to the promotion and dissemination of results.

Funding scheme: CSA – public procurement

- **Dissemination actions:** dissemination of specific project results (apart from publication / promotion on CORDIS and as success stories) is an integral part within each project. However, specific dissemination activities are, in addition, also envisaged:

- supporting actions implemented via calls for proposals (for 'bottom up' topics) or public procurement (for 'top down' topics): promotion of synergies, clusters of results within a given area (conferences, video/broadcasting, publications, prizes and awards, exhibitions and generic brokerage events, etc.);
- publication on CORDIS: information to proposers, information on funded projects; presentation of project results.

Funding scheme: CSA – public procurement

- **Monitoring, evaluation, and impact assessment:** NMP will comply with the prevailing requirements for monitoring, evaluation, and impact assessment. This may involve studies and surveys (implemented through public procurement) as well as panels of nominated experts and 'bottom up' inputs obtained through funded projects and Coordination and Supporting Actions. This will include the ex-post impact assessment of NMP activities under the 6th Framework Programme both at programme and project levels and studies of the longer term impact of Community funding of research in certain areas / disciplines / sectors. The impact assessment will comprise:

- the analysis of possible links with national activities in the context or ERA;
- the analysis of societal and industrial impact of technical change associated with the industrial transition.

Funding scheme: CSA – public procurement, expert contract

³⁸ In accordance with Articles 14, 17 and 27 of the Regulation No 1906/2006 of 18 December 2006 laying down the rules for the participation of undertakings, research centres and universities in actions under the Seventh Framework Programme and for the dissemination of research results (2007-2013).

Given that the possibility to assess the impact of RTD funding programmes is limited by the availability of adequate methodologies, NMP may also contribute to the development of novel or improved methodologies aiming at the chain from RTD result to innovation to impact.

□ **Promoting exploitation and innovation:** NMP will continue to fight the gap between the (generally high) level of scientific-technical success of its funded projects and the (often lower) level of actual implementation of these results (as necessary to lead to growth, competitiveness, sustainability, jobs). External assistance (the 'Exploitation Strategy and Innovation Consultants' service) will be used to identify and address possible obstacles to the future exploitation of the intended results (this service includes the 'Exploitation Strategy Seminars'). These initiatives are implemented through public procurement.

Funding scheme: These initiatives are implemented through CSA – public procurement

□ **Risk Sharing Finance Facility:** In addition to direct financial support to participants in RTD actions, the European Community will improve the/participants access to private sector finance by contributing financially to the 'Risk-Sharing Finance Facility' (RSFF) established by the European Investment Bank (EIB).

The European Community contribution to RSFF will be used by the Bank in accordance with eligibility criteria set out in the work programme 'Cooperation' (see details in Annex 4). RSFF support is not conditional on promoters securing grants resulting from Framework Programme calls for proposals, although the combination of grants and RSFF-supported financing from EIB is possible.

The use of the Community Contribution from the Specific Programme 'Cooperation' will be on a 'first come, first served' basis and will not be constrained by the proportional contribution of Themes.

IV.1 PUBLIC PROCUREMENT IN 2009³⁹

(1) Specific contracts to be concluded under framework contracts launched in 2007 and 2008

- **Project Technical Assistants (PTA)**

Subject: External assistance to enable detailed, prompt, pro-active, and scientifically competent follow-up by the Commission of ongoing NMP projects and NMP projects resulting from the calls for proposals in 2009.

Contracts: in each of the 33 lots, up to 3 specific contracts starting in the first quarter of 2009 and for a duration corresponding with the duration of the projects covered.

Budget: maximum EUR 550.000 in 2009.

- **Exploitation Strategy and Innovation Consultants (ESIC)**

Subject: External assistance to identify and address possible or actual obstacles to the future or imminent exploitation of the intended or already achieved results of projects (on-demand service; this includes the Exploitation Strategy Seminars service).

Contracts: 6 specific contracts (one every 2 months, first half in 2009), possibly complemented by order forms.

Budget: maximum EUR 450.000 in 2009.

(2) New procurement procedures

- **Assessment of impacts of NMP technologies and changing industrial patterns on skills and human resources**

Subject: Identify relevant trends over the next 20 years, in order to anticipate skill and competence gaps at research, engineering or manufacturing levels and to prepare proactive education, training and reskill schemes.

Contracts: 1 contract of 18 months

Timing: Second half of 2009

Budget: EUR 250 000

- **Economic foresight study on industrial trends and the research needed to support the competitiveness of European industry around 2025**

Subject: The study should elaborate and present quantitative prospective scenario(s) considering the expected positioning and potential of the European industry in the field relevant for research in nanotechnologies, materials and production technologies (NMP).

Contracts: 1 contract of 18 months

Timing: Second half of 2009

Budget: EUR 300 000

³⁹ The funding scheme: Coordination and support actions - public procurement in accordance with Articles 14 (b) of Regulation (EC) No 1906/2006 of 18 December 2006 laying down the rules for the participation of undertakings, research centres and universities in actions under the Seventh Framework Programme and for the dissemination of research results (2007-2013).

- **Comparative scoreboard and performance indicators in NMP research activities between EU and third countries**

Subject: Compare, assess and monitor implementation and progress of European strategic initiatives in industrial technologies.

Contracts: 1 contract of 2 years

Timing: Second half of 2009

Budget: EUR 325 000

V. INDICATIVE PRIORITIES IN YEAR 2010

For **Nano- and converging science and technology**, the second half of FP7 will be marked by a gradual shift towards more application oriented research as nanotechnologies from the laboratory environment towards applications in various industrial sectors are evolving. In 2010, the main focus will be on the environment as a whole: energy efficiency and sustainable energy production, the emergence of sustainable products (material and energy consumption, environmental impact, etc), de-pollution techniques and nano-analytical tools. The important RTD efforts associated with safety, health and environmental effects of nanotechnology will continue. Beyond RTD efforts, the accelerating introduction of nano-based products into markets requires a constant work of both societal debate and support, as well as comprehensive review of regulatory and standardisation aspects. These cross-cutting issues will be addressed through specific coordination and support actions, in consultation with the Nanosciences & Technologies Interservice Group.

The **Materials** part of the programme addresses new materials with a clear industrial application perspective while maintaining the enabling character of research activities. The 2010 call will have two main focuses. On the one hand, three topics which have a generic and multi-application character; to support substantial improvements in catalysis for increased energy efficiency; to realise better computer modelling needed for a better understanding of materials' degradation to increase their lifetime and reliability; and to study which materials will be needed to support European industry's competitiveness around 2020 on the basis of an economic foresight exercise.

On the other hand, the focus will be on three selected industrial and economic sectors that are strategic for Europe in the next decade; electronics and photonics (supporting the development of new organic-inorganic hybrids for future competitive innovation), health care (supporting novel rational designing of smart bioactive materials) and energy (developing new materials for far more efficient energy storage).

New production will concentrate on supporting the transformation of EU industry towards a sustainable knowledge-based industrial environment. In 2010 the topics will address production methods, production tools and the industrial processing of new materials for new products. They will further focus on the sustainability of the entire product value chain in terms of quality and environmental impact (e.g. embedded intelligence of products and systems to use in building's life cycle management new industrial models for sustainable and efficient production) and on the changing consumption patterns requiring more customised, more functional and more sustainable products (e.g. supply chain approaches for small series industrial production)

The **integration** activities will focus on nano health application and on nanotech-based sensors. In addition, engineering and multi-functional fibre-based products (e.g. for use in packaging) and new technologies for optimised product development will be addressed.