WORK PROGRAMME 2007-2008

COOPERATION

THEME 4

NANOSCIENCES, NANOTECHNOLOGIES, MATERIALS AND NEW PRODUCTION TECHNOLOGIES - NMP

(European Commission C(2007)2460 of 11 June 2007)

Changes to the Cooperation Work Programme: NMP Theme

This work programme is an update with respect to the version adopted on 26 February 2007. The changes relate to the inclusion of the budgetary figures 2008.

Table of contents

Objective

Improve the competitiveness of European industry and generate knowledge to ensure its transformation from a resource-intensive to a knowledge-intensive industry, 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 FP7 Themes.

I Context

I.1 Policy context

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 effectively 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. 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 to not only stop the relocation of European industry, but also create new industries, and hence growth and employment. Furthermore, it should be driven and supported by a competitive knowledge production capacity at the global level.

The NMP Theme pursues the overall objective of enhancing the competitiveness of European industry 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 prerequisites, and societal values and expectations. The competitiveness of more mature industries is also largely dependent on their capacity to integrate knowledge and new technologies.

I.2 Approach

NMP ensures continuity with previous programmes, but it has evolved on the basis of the acquired experience and of the challenges imposed by the needs of European industry.

Europe's position still needs to be strengthened in the research activities related to nano-sciences, nanotechnologies, materials and production technologies within the highly competitive global context. The competitiveness of industry will largely depend on new knowledge and on new ways of integrating and exploiting existing and new knowledge. Europe can benefit from its recognised leadership in specific fields and particularly through bringing specialist disciplines together.

A key issue will be to integrate competitiveness, innovation and sustainability into the research activities covered by the Theme as well as initiatives capable of fostering the dialogue with society at large. In addition to taking into account the Strategic Research Agendas (SRAs) of the several European Technology Platforms associated with this Theme 4, research has to be complemented by activities aimed at education, and skills development and addressing the more long-term research issues underlying many technology fields.

A key element of Theme 4 is the effective integration of nano-technology, materials science, design and new production methods, so as to achieve and maximise impacts for industrial transformation and, at the same time, supporting sustainable production and consumption.

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. The strategic approach will be strongly focused on

demonstrable added value in EU industry arising from a proper appreciation of the potential of nanotechnologies, materials and production technologies.

To this end Theme 4 is structured as follows:

a) Three thematic activities, Nanosciences and Nanotechnologies, Materials and new Production Technologies, each of which requires significant new RTD efforts to generate knowledge and integrate its different technologies for problem-solving approaches.

b) A fourth activity of "Integration" as such, which aims at developing new applications and new approaches in different industrial sectors by combining research from the first three activities. This is a deliverable-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. Applications in all sectors of industrial activities and areas of application may be supported including materials sciences and technologies, efficient health, safety and environmental (HSE) evaluation, high performance manufacturing and process technologies, nanobiotechnology and nanoelectronics, instrumentation, etc.

In the **long term**, this Theme aims at capitalising on the enormous potential of nanosciences and nanotechnologies for the creation of a true knowledge-based industry and economy. Emphasis will be increasingly given to research helping to develop the S&T base in particular in nanosciences, nanomaterials and nanomanufacturing.

In the **medium term**, the focus is on a convergence of knowledge, technologies and skills drawn from different disciplines, exploiting application-driven scientific and technological synergies.

In both cases it will be essential to ensure the uptake of knowledge generated through effective dissemination and use of the results.

Emerging and unforeseen needs in NMP

In line with the NMP strategy, research on emerging needs will be carried out, notably to address emerging specific scientific and societal issues as well as new technological challenges deriving from on-going research closely related to the activities of the Theme. Any unforeseen needs will be addressed in a flexible way and may, for example, relate to existing and possibly modified regulations, to standardisation, to support the transformation towards a knowledge-based industry, or to an exploration of the potential for possible ethical, health, safety and environmental impacts arising from nanotechnologies.

SMEs

The NMP Theme is particularly relevant to SMEs of 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 Theme 4.

In addition, dedicated calls for collaborative projects targeted to SMEs will be implemented in specific areas with the aim of reinforcing the scientific and technological base of SMEs and of validating innovative solutions. SME projects should be led by SMEs with R&D capacities and, obviously, include the participation of universities, research centres and other industries or industrial associations as appropriate. In each project, at least 35% of the EC contribution is expected to be allocated to the participating SMEs.

International Cooperation

The increasingly important *international dimension* of industrial research requires a well-coordinated approach to working with third countries and in international forums. International cooperation activities will therefore be an important issue across the Theme, where there is clear mutual benefit in terms of knowledge generation and market expansion. Specific actions may include:

- activities with industrialised countries and those having signed an S&T cooperation agreement in the fields of NMP, that may be implemented via coordinated calls to address objectives of mutual interest;
- specific initiatives to promote the participation in the NMP Theme of emerging economies and

developing countries to secure their access to advanced knowledge. These initiatives will consist of 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 other initiatives for fostering cooperation. Initial contacts have been established with third countries such as China, India and Russia.

- the Intelligent Manufacturing Systems (IMS) scheme, which allows RTD cooperation between the member regions of the IMS agreement[1];
- the development of internationally harmonised standards and nomenclature;
- dialogue with major countries on a "*code of conduct*" for the responsible and safe development of nanotechnology.

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.

Coordination with National activities

Specific actions to **coordinate programmes and joint activities** conducted at national and regional level will also be carried out through *ad hoc* schemes (with particular reference to ERANET and ERANET-*plus*) so as to promote convergence of national research programmes and to reinforce critical mass and national as well as technical synergies within and between the emerging European Technology Platforms. Industrial research will benefit from the coordination of activities in areas such as metrology, toxicology, standards and nomenclature.

Actions to improve synergies between the research activities of Member States and Associated States, including COST and Eureka, are also envisaged.

Coordination with other Themes

The cross-sectoral nature of Theme 4 – NMP – means that obvious links also exist between NMP and the other Themes of the 7th Framework Programme under the Specific Programme "Cooperation", in particular Health, Food, Security, Space, ICT, Energy, Environment, Transport. Cross-thematic areas will be addressed, on the one hand, through **joint calls** published jointly with other Themes, thus ensuring that the same objectives are achieved and, on the other hand, through **coordinated calls** so as to address complementary objectives via a coordinated approach. Synergy with the Specific Programme "Capacities" of the 7th Framework Programme will be put forward.

Funding Schemes

Theme 4 will be implemented through the following funding schemes common to FP7:

- ***Collaborative projects***: Small or medium-scale focussed research projects and large scale integrating projects will be subject to separate calls. For the small or medium scale focussed research projects the **maximum** EC funding requested must not exceed € 4 million, while for large scale integrating projects the **minimum** EC funding requested must exceed € 4 million. The financial resources mobilised within projects will be assessed against the real work to be carried out and, therefore, a wide range of project-sizes (within the limits given by the thresholds mentioned above) is expected.
- ***Networks of excellence*** will be used to promote durable integration of key competencies where still needed, so as to support integrating research activities in strategic areas for European competitiveness. These Networks should show clear impacts in structuring and reinforcing research capacities in the fields covered by the Theme. Training is an integral part of the activities.
- ***Coordination and Support actions*** may relate to coordination and networking activities, at European and international, national or regional level (organisation of events, studies, where relevant, organisation and

[1] The agreement for S&T technical cooperation in the domains of IMS is between the European Community and the United States of America, Japan, Australia, Canada, Korea, and the EFTA States of Norway and Switzerland.

management of joint or common initiatives); activities to support the implementation of the Theme (including dissemination, information and communication); 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.

Other activities within the programme

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

- the use of appointed **external experts** for the evaluation of project proposals and, where appropriate, for the reviewing of running projects;
- **studies** into relevant future needs of industry and society; whilst proposals for "bottom up" studies may be submitted as Coordination and Supporting Actions, "top down" studies will be implemented through public procurement;
- the use of **external assistance** (by "Project Technical Assistants") as necessary to enable detailed, prompt, pro-active, and scientifically competent following of the projects by the Commission (to be implemented through public procurement);
- where appropriate, the Commission will issue **Calls for Tender for public procurements** 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.
- **Dissemination actions:** dissemination of specific project results (apart from publication / promotion on CORDIS and as success stories) is meant to be an integral part within each project. However, in addition, specific dissemination activities are 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.
- **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 projects from the 6th Framework Programme and studies of the longer term impact of Community funding of research in certain areas / disciplines / sectors.

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), but will use a wider range of tools than the Technological Implementation Plan (TIP) Seminars and Exploitation Strategy Seminars offered to limited numbers of projects in the 5th and 6th Framework Programmes. External assistance to identify and address possible obstacles to the future exploitation of the intended results of projects will be offered throughout the lifetime of these and will not be limited to a fixed format. These initiatives will be implemented through public procurement.

- **Risk Sharing Finance Facility** (see annex 4): In addition to direct financial support to participants in RTD actions, the European Community will improve their 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 'Co-operation' (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.

In accordance with the Specific Programme 'Cooperation' which stipulates that the Community contribution to RSFF will be funded by proportional contributions of all Themes, except Socio-economic Sciences and the Humanities, the Commitment Appropriations for this Theme to RSFF in 2007 will be EUR 18.140 million. This amount will be committed entirely in 2007.

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.

Participation of women in research and gender dimension

The pursuit of scientific knowledge and its technical application towards society requires the talent, perspectives and insight that can only be assured by taking due account of the value of women in RTD activities and in the process of transforming the European industry. The 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, toxicity and risk as well as areas where industrial technologies research is aimed at medical applications e.g. in the case of nanomedicine - diagnostics, drug-delivery or regenerative medicine. NMP is committed to undertake specific measures (such as analysis, workshops, etc.) to ensure practical uptakes of this issue together with industry.

II Content of calls for proposals in 2007

The work programme content for Theme 4 – NMP presented below introduces each activity and gives a description of the research topics for which proposals are called. 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. It will nevertheless be the task of the proposers, on a case by case basis, to identify in detail the expected quantitative and qualitative impacts of their project.

Each research topic specifies which funding scheme is to be used.

Priority topics to be included in future calls are described under Chapter V.

For the NMP Theme, the **evaluation** of proposals for Collaborative projects (including those dedicated to SMEs) and Networks of Excellence 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.

Theme 4 activities and related topics described below will be implemented through calls for proposals as described in *Chapter IV: Implementation of calls*.

The multidisciplinarity of the NMP Programme and the preparation of the WP

The NMP theme within the Specific Programme "Cooperation" under FP7 has as its main strategic objective the transformation of EU industry. It therefore 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.
- The necessary synergetic **integration** of RTD from these three technological domains, wherever this is possible, is evident to everyone.

No other FP7 Theme presents such characteristics related to practically all human endeavour. Moreover, the **sustainability** concern (balance in economic growth, social well-being and benign approaches in terms of public health, occupational safety, and environmental protection) resides at the centre of any industrial RTD development. All the above require close attention and cooperation with several **other FP7 Themes**.

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. The NMP programme is the most involved among FP7 Themes, since it is directly related to 12 and indirectly to 4 of these 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.

The multidimensional elements identified above present a challenge for the preparation of a common Work Programme for NMP. For instance, a topic appearing under one of the first three activities (N, M, P) might well have as many integration threads as a topic under the "Integration" activity itself, while topics stemming from the strategic vision of a particular ETP may appear either under the "Integration" activity or under any one of the other three.

II.1 Activity 4.1 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 and 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. Specific actions may also 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.

4.1.1 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 related disciplines, cognitive sciences, social sciences, etc.

NMP-2007-1.1-1 Nano-scale mechanisms of bio/non-bio interactions

Technical content / scope: A better understanding of the interactions between biological entities and nanostructures is of central importance for functionalised materials and systems such as the development of active surfaces with adapted biocompatibility, improved amalgamation in heterogeneous materials, effective industrial processes, etc. The objective will be to explore the interaction mechanisms at the nano-scale between biological systems and nanostructures (including surfaces). The expected projects should foresee upstream interdisciplinary research on nanostructures which induce specific behaviour on contact with biological systems and explore the interaction with and effect on these biological systems. The expected projects should pave the way for future industrial application by enabling the design of structures which interact in a predictable and

controllable way with biological systems; thereby improving performance of industrial processes (e.g. biocide surfaces for industrial or clinical use, medical devices, functionalised packaging, technical and medical textiles, bioresponsive materials, etc.). The expected projects should combine experimental and theoretical work such as modelling of the basic processes and functional units, as appropriate.

Funding scheme: Small or medium-scale focused research projects

Specific features: Consortia could include users.

Expected impact: (i) Solutions going well beyond the state of the art; (ii) substantial innovation in industry and perspectives for new products with higher added value in various sectoral applications (e.g. marine industry, construction, energy production, medical and hygiene applications, textiles, etc.); (iii) medium-long term innovation in industrial processes (e.g. food industry or waste management).

NMP-2007-1.1-2 Self-assembling and self-organisation

Technical content / scope: Self-organisation is a very promising approach, in particular regarding cost-effective up-scaling. 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. The objective will be to achieve systems with predictable and controllable properties in particular composition and physico-chemical structure. The expected collaborative projects should foresee research for the development of nanostructures by self-assembling and self-organisation aimed at motifs capable of generating new functionalities. Understanding the underlying processes of self-organisation and their application to the bottom-up design of structures/materials, in particular with regard to multi-scale and multi-component self-organising systems, should be a main topic of the activities (including appropriate computer modelling). Combining self-organisation with other methods for controlled structuring must be part of the exploration of concepts for future application.

Funding scheme: Small or medium-scale focused research projects

Specific features: Consortia could include users.

Expected impact: (i) Solutions going well beyond the state of the art; (ii)substantial innovation in industrial processes, such as chemistry, optics or electronics; (iii) more added value and/or lower production costs; (iv) innovative industrial ways contributing to sustainable production and development.

NMP-2007-1.1-3 Support to networking ICPC[2] researchers in nanotechnology and creation of a free and open electronic archive of nanosciences and nanotechnologies scientific and technical publications

Technical content/scope: The European Commission aims to avoid that a number of countries are put in the factual impossibility of profiting from the benefits of nanotechnology. The EC strategy puts the "nano divide" as a target to address and reduce. The expected support action should select and present scientific and technical publications of nanosciences and nanotechnologies (made completely accessible or referred to) in an open and freely accessible database. User-friendly tools for text mining, including support for effective use, could be considered as well as a system of cross links. Access and information about updates and important news should preferably be provided via an existing and well established European website. This electronic archive should be organised to allow partner search and networking amongst researchers and stakeholders in ICPC (International Co-operation Partner Countries) so as to facilitate research in nanotechnology and related activities such as education or the application of research results. Networking with European researchers is encouraged in order to facilitate the inclusion of researchers from ICPC in the FP7 calls concerning nanotechnology.

Funding scheme: Coordination and support actions aiming at supporting research activities.

Specific features: Cooperation with ICPC is encouraged. The main elements should be in existence within 12 months and the archive should be made available for general access. It should be regularly updated within a

[2] ICPC: International Cooperation Partner Country (see list in Annex 1)

total indicative duration for this action of 4 years. Only one electronic archive support action will be funded. The consideration of gender issues is encouraged, where appropriate.

Expected impact: (i) Dissemination of selected high quality information in countries where nanotechnology is not yet developed; (ii) networking amongst researchers; (iii) fight against the "nano divide"; (iv) inclusivity in the research and development in nanotechnology; (v) sustainable development; (vi) implementation of the European Commission's Action Plan forNanosciences and Nanotechnologies; (vii) reinforcement of the international dimension of European research within the 7th Framework Programme; (viii) improved knowledge of the FP7 in ICPC and facilitation of their participation in further calls for proposals.

NMP-2007-1.1-4 Development of methodology, collection and elaboration of scientific-technical and socio-economic data and studies on nanosciences and nanotechnologies, including risk assessment, and establishment of an observatory.

Technical content/scope: Investment in nanotechnology is rising in Europe as well as worldwide. As for all technologies, "limits" and "risks" need to be addressed. Stakeholders need reliable and complete data in order to take decisions such as for the allocation of funding, regulations or other initiatives. With this support action an observatory should be established, appropriate methodology developed, data collected and analysed so as to provide European decision makers with state-of-the-art analyses as well as dynamic assessments of nanotechnology development and use, allowing stakeholders to understand levels of success and critical issues, and to take actions. The expected support action could include networking of existing national activities and/or centres, and address: research and relevant economic activities of countries and organisations with a focus on comparing the European Research Area with other significant regions of the world; strategies and trends of research in nanotechnology not under public funding; nanotechnology infrastructures in respect to their availability and accessibility in Europe; market data and market potential in nanotechnology and nanotechnological sub-areas, including products and sectors involved; road-mapping; economic and social impact of nanotechnology, including consideration of needs for science-based communication. A roadmap of actions, actors and timing could also be developed with the view of achieving a "safe and responsible" level of competitiveness for the European nanotechnology-based industry. When appropriate, possible best practices should be identified. A balanced "governing board" encompassing with equilibrium representatives of all main EU stakeholders should be established. This action should take into account relevant existing and ongoing activities, and be complementary to them. A user-friendly and inter-operable database that links together the different pieces of information should be created so as to allow cross analyses and comprehensive overviews. . It should also aim at integrating or linking, where appropriate, relevant data available from other sources, such as specific databases on the impact of nanotechnology on public health, occupational safety, and the environment.

Funding scheme: Coordination and support actions aiming at supporting research activities.

Specific features: The indicative duration of this action should be 4 years. Maximum grant: € 4 million. Only one observatory and support action will be funded. Gender issues should be considered and gender-specific data should be produced, where possible.

Expected impact*:* (i) Support to the European Commission and the EU Member States decision making procedures; (ii) support to actions and work of all stakeholders: researchers, industrialists, investors and the "civil society"; (iii) orientation for the appropriateness for dedicated European infrastructures and the possible interest of creating *poles of excellence* in well identified subjects; (iv) sustainable development; (v) support to good governance in nanotechnology; (vi) implementation of the European Commission's Action Plan for Nanotechnology.

NMP-2007-1.1-5 ERANET Plus in nanosciences[3]

Technical content/scope: New development in nanotechnologies relies heavily on fundamental research in nanosciences. Future applications of nanotechnologies will emerge thanks to the understanding of the "nano-world" that nanosciences are presently developing through extensive exploratory fundamental research. The aim of the ERANET Plus project is to pool the necessary financial resources from the participating national (or regional) research programmes and the Community with a view to launching a joint call for proposals for basic research projects in nanosciences that will be evaluated and managed jointly by the participating programmes. The joint call should be planned with a clear focus on the interdisciplinary nature of nanosciences as well as on the added value deriving from the cooperation at transnational level. The proposals submitted to the joint call shall be evaluated according to a common peer review evaluation mechanism. A fixed set of broader evaluation criteria (including excellence and European added value) shall be included in the set of common criteria to be defined by the participants. Thematic focusing of this joint call should be commensurate with the funds available, so as to ensure a reasonable rate of success in the call. Details on the topics covered by the call will be decided by the participants in due time but shall be selected upon consultation with the Commission services concerned. Topics should be wide enough to allow for interdisciplinary collaborations and, for example, could relate to the fabrication, characterisation, study and use of individual nano-objects applied to the study of cellular processes.

Funding scheme: Coordination and support actions. This ERANET Plus action will be supported through Coordination and Support Actions. The Community contribution, that will include a limited and small financial support for the launching and management of the joint call, will essentially provide funding for topping-up the national (or regional) contributions to the joint call budget. The total EC contribution for this ERANET Plus project is limited to a maximum of 1/3 of the total cumulative joint call budget, up to € 8 million.

Specific features: See Annex 4. To be eligible, ERANET Plus proposals have to respond to the following criteria:

- a single joint call should be planned with a clear financial commitment from the participants;
- eligible participants are programme owners or programme managers. A minimum of 5 participants from 5 different Member or Associated States providing funding in the joint call is requested;
- minimum financial budget of the joint call: € 5 million;
- each project to be retained for funding shall be transnational (minimum 2 partners from different countries).

Expected impact: (i) Improve coordination and reduce overlapping in key fields of research; (ii) achieve critical mass and ensure better use of limited resources in fields of mutual interests; (iii) share good practices in implementing research programmes; (iv) promote transnational collaborations and new knowledge generation.

4.1.2 Nanotechnologies and converging technologies

Europe enjoys 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

[3] This topic is subject to a joint call for ERA-NETs across the Themes. For further information see Annex 4.

considered including health, safety and environmental issues as well as nomenclature, metrology and standardisation.

NMP-2007-1.2-1 Pilot lines to study, develop and up-scale nanotechnology-based processes from laboratory

Technical content/scope: The transfer of promising nanotechnology research results into new industrial technologies still represents a bottleneck. The expected projects should be focused on the scale-up of innovative nanotechnology-based and laboratory-scale processes to pilot-line-scale for industrial application. The expected projects should include appropriate modelling to design and predict processes and production lines. The goal is thus to facilitate the transfer from laboratory-scale activities to larger scale processes that would open the way for industrial production lines thereby enhancing European competitiveness. Economic aspects of the proposals are therefore crucial and possible solutions should present a strong link to market needs. The projects could include an assessment regarding public health and consumer protection, occupational safety and the environment, as well as an evaluation of impacts on regulation.

Funding scheme: Large-scale integrating collaborative projects

Specific features: Additional activities other than research could be included as appropriate, such as metrology for online monitoring and control, safety issues, specific education modules or the analysis of existing and required regulations. If appropriate, accompanying life cycle assessment (LCA) studies should be performed according to ISO 14040ff and the data should be provided according to data format and quality requirements set up by the European Platform for LCA (http://lca.jrc.ec.europa.eu). In line with the objectives of this topic, adequate industrial participation is recommended.

Expected impact: (i) Solutions going well beyond the state-of–the-art; (ii) stimulation and acceleration of the industrial take-up of promising results beyond laboratory scale; (iii) new competitive industrial processes; (iv) sustainable development.

NMP-2007-1.2-2 Equipment and methods for nanotechnology

Technical content / scope: Equipment and methods for characterisation and operations at the nanoscale are needed in order to explore and exploit size dependent phenomena with the aim of developing innovative materials, products, devices and processes or enhance quality control systems. The research projects should focus on the development of instrumentation and methods for measurement, analysis and operations at the nanoscale to characterise nano-features with improved resolution and/or increased sensitivity, based on novel approaches or novel combinations of approaches. This is a particular challenge when the feature sizes approach the 10 nm range or beyond. The equipment developed should be capable of working accurately, reliably and reproducibly and it is intended to meet the performance and cost requirements at research laboratory level. Accordingly, the proposed projects should aim at developing tools, namely instruments and/or methods and/or their combination, including novel software both for measurement and analysis, and data handling – as appropriate. The projects should represent a clear step ahead of the state-of-the-art. Significant technical applications are on-line and off-line characterisation and operations at nanoscale e.g. characterisation and quantification of measure of novel functionalities and performance, handling and treatment of samples or positioning at atomic level.

Funding scheme: Collaborative projects targeted to SMEs

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 fields. Research and innovation activities need to be covered by the projects. In each project, at least 35% of the EC contribution is expected to be allocated to the participating SMEs. The projects will be led by SMEs with R&D capacities but the coordinator does not need to be an SME. The participating SMEs should have the decision making power in the project management. The output should be for the benefit of the participating SMEs and the

targeted SME dominated industrial communities. Additional activities other than research could be included as appropriate, such as metrology, pre- and co-normative activities like the development of (certified) reference materials, safety issues, specific education modules or the analysis of existing and required regulations.

Expected impact: (i) New or improved equipment; (ii) support to the development of new nanotechnology-based products and industrial processes, to their tailoring of properties and reliability.

NMP-2007-1.2-3 Analysis of the ethical, regulatory, social and economic environment of nanomedicine

Technical content / scope: Nanotechnology will have a large impact on medicine and will add a new dimension to many ethical, regulatory, social and economic issues in this area. This support action should make a survey of existing relevant documents in the field, analyse the implications above looking at mid to long-term impacts of nanomedicine and foresee scenarios on the possible consequences for the citizens, society, economics and social structures, including costs of future health care (foresight). A "round table" involving scientists, experts on ethical, regulatory, social and economic issues, patient groups, regulatory agencies, health insurance, policy makers and company representatives should be established based upon existing activities. With a view of contributing to future strategic decisions responsive to the needs of all stakeholders, the round table will help to define the requirements of the patient and society as well as the regulatory, social and targeted communication frameworks, which will be an important requirement for successfully introducing new nanomedical innovations to the market. Conclusions should be drawn and recommendations should be issued.

Funding scheme: Coordination and support actions aiming at supporting research activities.

Specific features: Maximum duration: 12 months. Gender issues should be considered.

Expected impact: (i) Support to stakeholders' decision making concerning nanomedicine: public authorities, industry, researchers and citizens; (ii) support to good governance in nanotechnology; (iii) support to the safe, integrated and responsible approach as laid down in "Nanosciences and Nanotechnologies: An action plan for Europe".

NMP-2007-1.2-4 Coordination in nanometrology

Technical content/scope: Nanosciences and nanotechnologies are rapidly growing on the one hand due to their great potential in terms of developing new products and processes, and on the other hand due to the continuous development of analytical and manipulation equipment that make operating at the nano-scale possible. However, challenges are also great, in particular since many researchers and industries are involved, and precision, accuracy, repeatability and reproducibility of measurement, analysis and methods are not yet reliably consolidated. A Europe-wide effort is therefore required bringing together interested leading centres. This will allow precious synergy to be achieved in Europe and valuable output for the scientific and industrial communities. This coordination action should address the identification and co-ordination of top-class activities carried out in Europe in the field on nanometrology and particularly for the (i) characterisation of reactions, materials, mechanisms, structures and systems at the nano-level, and (ii) performance assessment and improvement of methodology, operational praxis and use of equipment. Aspects focusing on measuring health, safety and environmental impact of nanotechnology do not need to be specifically considered within this coordination action. Further issues such as nomenclature, specific metrology, harmonisation work and pre-normative research for potential standards, (certified) reference materials, intellectual property rights should be addressed, as well as dedicated education and training, and the service to industry and particularly to SMEs. This action should take into account relevant existing and ongoing activities, and be complementary to them.

Funding scheme: Coordination and support actions aiming at coordinating research activities.

Specific features: Collaboration with CEN TC 352 is encouraged and appropriate exchange of information at international level may also be considered.

Expected impact: (i) Capacity building in Europe in nanometrology; (ii) improved reliability of measurement and analysis at the nano-level; (iii) support to the development of new nanotechnology-based products and industrial processes, to their reliability, safety and future commercialisation on the global market; (iv) support to research and regulation; (v) sustainable development; (vi) implementation of the European Commission's Action Plan for Nanotechnology; (vii) elements relevant to establishing the creation of one (or more) leading *pole(s) of excellence* that will be able to support industrial activities, in particular benefiting high-tech SMEs.

NMP-2007-1.2-5 Examining capacity building in nanobiotechnology

Technical content/scope: The field of nanobiotechnology is an extremely rapidly growing research area. Challenges are big, in particular since nanobiotechnology greatly benefits from an interdisciplinary ("converging") approach, including (i) various scientific and technical disciplines, (ii) entrepreneurship for transforming new knowledge into value-added technologies (often with the creation of new SMEs), and (iii) societal, ethical and regulatory considerations in order to correctly cope with European people's expectations and concerns. Ancillary aspects can also play a critical role to achieve or fail to achieve success at European level, such as nomenclature, specific metrology, harmonisation work for potential standards, (certified) reference materials, intellectual property rights as well as dedicated education and training, and the service to industry and particularly to high-tech SMEs. Therefore, the involvement of actors with expertise in many aspects is needed in order to develop nanobiotechnology successfully and timely, and this requires a Europe-wide effort. The support action should explore the definition, establishment and further development of a European scale infrastructure on nanobiotechnology, and the establishment of a realistic roadmap. It will also address the identification of top-class activities carried out in Europe, assessing their positioning with respect to the international scene.

Funding scheme: Coordination and support actions aiming at supporting research activities.

Specific features: Maximum duration: 12 months.

Expected impact: (i) Capacity building in Europe in nanobiotechnology; (ii) support for the development of new nanobiotechnology-based products and industrial processes, for their reliability, safety and future commercialisation on the global market; (iii) implementation of the European Commission's Action Plan for Nanotechnology; (iv) elements relevant to establishing the creation of one (or more) leading *pole(s) of excellence* that will be able to support industrial activities, in particular benefiting high-tech SMEs.

4.1.3 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 close 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.

NMP-2007-1.3-1 Specific, easy-to-use portable devices for measurement and analysis

Technical content / scope: Risk assessment is based on appropriate characterisation of materials, hazard and monitoring and assessment of exposure. At present, there are few relevant studies on exposure to engineered nanoparticles, but it is believed that the greatest potential for human exposure over the next few years will be in

the workplace. Gathering relevant and objective data on real exposure by allowing for background distinction at the workplace for industrial processes (e.g. production of nanoparticles, particularly when present in aerosols) represents a challenge and needs the development of appropriate personal measurement systems. The objective of the expected collaborative projects would be to develop and validate affordable, portable, adequate sampling and measurement equipments for monitoring working environments (i.e. quantification and characterisation of airborne nanoparticles in particular). These devices and methodologies for routine and non-routine exposure measurements should show an adequate degree of specificity, accuracy, user-friendliness and moderate production costs and produce data suitable for their use in exposure modelling systems.

Funding scheme: Large scale integrating collaborative projects

Specific features: Additional activities other than research should be included as appropriate, such as safety issues, specific education modules or the analysis of existing and required regulations. In line with the objectives of this topic, adequate industrial and SME participation is recommended.

Expected impact: (i) Safety of new nano-materials and -systems, and of nanotechnology-based products and services; (ii) safe and cost-effective minimisation of the exposure of workers when manufacturing nano-scale entities; (iii) sustainable and responsible development; (iv) support to research and regulation; (v) implementation of the European Commission's Action Plan for Nanotechnology.

NMP-2007-1.3-2 Risk assessment of engineered nanoparticles on health and the environment

Technical content / scope: The understanding of the safety, environmental and human health implications of nanotechnology-based materials and products is important worldwide. Reinforced cooperation has been initiated on this matter with the USA and in particular between the European Commission and the USA Environmental Protection Agency. It is advantageous to share and harmonise the research effort to increase efficiency and prevent any duplication of effort, also since it addresses pre-competitive questions. This research will create a reliable and sound foundation for the assessment of the safety of nanotechnology-based products and encourage nanotechnological advances that can address the needs of citizens and contribute to sustainable development objectives. Projects under this call should be related to engineered nanoparticles and should address one or more topics in the following areas: hazard characterisation, exposure, toxicology, main endpoints of and health effects of engineered nanoparticles; testing; monitoring/detection of engineered nanoparticles in the various environments (excluding the development of equipment); environmental and biological fate, transport, and transformation of nanoparticles. The interdisciplinary research should contribute to better understanding of toxicokinetics, cellular and molecular mechanisms, behaviour and fate, bio-persistence, biokinetics, to understand fundamentally the exposure, behaviour, mechanisms, consequences and potential effects to various endpoints of nanoparticle-biological entities interactions.

Funding scheme: Small or medium-scale focused research projects

Specific features: Cooperation with the USA research teams is strongly recommended, possibly through balanced participation EU-USA in each project. EU funding for US participants is not foreseen within the present call. Gender issues should be considered, where appropriate.

Expected impact: (i) Better *in vitro* or *in vivo* methodologies for the regulatory demands for the safety assessment of nanotechnology products, (ii) better understanding of the impact of the nanoparticles on health, safety and the environment; (iii) future definition of appropriate measures, where needed; (iv) safe and cost-effective minimisation of the exposure of workers; (iv) sustainable and responsible development; (v) support to research and regulation; (vi) implementation of the European Commission's Action Plan for Nanotechnology; (vii) reinforcement of the international dimension of European research within the 7th Framework Programme.

NMP-2007-1.3-3 Scientific review of the data and studies on the potential impact of engineered nanoparticles on health, safety and the environment

Technical content / scope: Data on environment, safety and health effects of engineered nanoparticles need to be periodically reviewed in order to exploit the results and duly orient future research and risk management actions. In particular, a focus on nanomaterials that are likely to be produced and used in higher quantities is needed. Specific attention should be paid to carcinogenic, mutagenic or reprotoxic (CMR) properties, as well as problematic properties for the environment (like persistence or bioaccumulation). The support action(s) should collect and assess published scientific and technical data, perform a critical review to provide a state-of-the-art overview of current knowledge, produce detailed report(s) on the toxicological profiles and identify remaining uncertainties. Dynamic processes could also be considered e.g. agglomeration or de-agglomeration and other unintended reactions or interactions with surrounding media. The nanoparticles addressed with the present call are: (i) fullerene and derivates, (ii) nanotubes and derivates, (iii) metals and (iv) oxides. Conclusions should be drawn and recommendations should be issued, for research or for other initiatives.

Funding scheme: Coordination and support actions aiming at supporting research activities.

Specific features: Maximum duration: 12 months. Consortia are encouraged to be multidisciplinary, including expertise in areas of toxicology and eco-toxicology. Gender issues should be considered, where appropriate.

Expected impact: (i) Better understanding of the impact of nanoparticles on health and the environment, and definition of future actions; (ii) sustainable and responsible development.; (iii) support to research and (iv) support to regulatory measures and implementation of legislation.

NMP-2007-1.3-4 Creation of a critical and commented database on the health, safety and environmental impact of nanoparticles

Technical content / scope: A free access database (including tools) established at European level is needed to allow a comprehensive analysis of published data. This support action aims at creating a database on environment and health effect, which should include physicochemical characterisation and properties of nanomaterials, explosion risks, hazard information like acute and chronic toxicity, toxicokinetics, ecotoxicity, bioaccumulation, exposure information throughout the life cycle of nanomaterials, environmental fate of nanoparticles, results from *in vitro* studies (such as cell and tissue penetration, potential circulatory effects, mutagenicity and genotoxicity, where the case), *in vivo* studies and occupational epidemiological studies. The database should be useful to identify potential risks with nanomaterials for workers, consumers or public at large. It should contain structured information from research papers and provide tools for text mining,. The database could serve the needs of users with different profiles (general public, scientific community, regulators) and also contain a collection of research papers with their metadata (paper source, authors, date, etc.). The database should be at European level and allow integration with other European related databases such as those related to chemicals, food or pharmaceutical and medical products. Moreover, it could also serve as interface with similar non-EU databases. A balanced "governing board" encompassing representatives of all main EU stakeholders should be established. Activities should take into account existing and ongoing EU projects of a similar nature, and be complementary to them or based upon them. Access to the database and consolidated information of the results of the analyses, updates and methodology should be provided appropriately.

Funding scheme: Coordination and support actions aiming at supporting research activities. Only one database and support action will be funded.

Specific features: Main elements should be created within 12 months and the database should be made available. It should be regularly updated within a total indicative duration for this action of 4 years. Activities should take into account existing and ongoing relevant initiatives involving the creation of databases. Gender issues should be considered, where appropriate.

Expected impact: (i) Better understanding of the impact of nanoparticles on health and the environment, and definition of future actions; (ii) safe and responsible development and use of nanotechnology; (iii) support to research and regulation; (iv) support to regulatory measures and implementation of legislation; (v)

implementation of the European Commission's Action Plan for Nanotechnology; (vi) support to good governance in nanotechnology.

NMP-2007-1.3-5 Coordination in studying the environmental, safety and health impact of engineered nanoparticles and nanotechnology based materials and products

Technical content / scope: Knowledge regarding the toxicological and ecotoxicological profile of nanomaterials as well exposure data should be integrated to the rapid development of the technology and sufficient data should be available for a proper risk assessment. Existing standard test methods have been developed under current regulatory regimes for traditional chemicals and may need adjustment to be applied to nanomaterials. An effort is therefore needed to develop adequate methodologies, taking advantage of the latest scientific and technical evidence across all relevant disciplines. Collaboration among research groups and coordination of research efforts will increase efficiency, which may more rapidly lead to adoption of standardised and validated methods essential for regulatory activities. The expected coordination action should address amongst others but not exclusively, the following activities:

- Coordination in establishing and performing test strategies and methods for toxicity and ecotoxicity with a view to develop efficient test systems and tiered testing approaches for nanomaterials;
- Coordination in studying possibilities to develop quick screening methods for (eco)toxicity, *in vitro* models and predictive models for (eco)toxicity for nanomaterials, in particular focussing on properties like carcinogenicity, mutagenicity, reprotoxicity, bioaccumulation and persistence;
- Coordination in approaching risk assessment tools for nanotechnology-enabled products, including modelling, exposure scenario development and life-cycle analysis;
- Coordination in developing risk assessment methodology for assessing environmental and health effects of nanomaterials and for performing impact assessments**.**

Funding scheme: Coordination and support actions aiming at coordinating research activities.

Specific features: None

Expected impact: (i) Synergy, increased efficiency and effectiveness in the European research activities in this field; (ii) better understanding of the impact of nanoparticles on health and the environment, and definition of actions; (iii) safe and responsible development and industrial use of nanotechnology; (iv) support to regulatory measures and implementation of legislation (v) support to industrial decision making, to EU research and to other EU policies; (vi) implementation of the European Commission's Action Plan for Nanotechnology; (vii) creation of one (or more) leading pole*(s) of excellence* that will be able to support industrial activities, in particular benefiting high-technology SMEs.

II.2 Activity 4.2 Materials

Added value materials with higher knowledge content, new functionalities and improved performance are increasingly critical for industrial competitiveness and sustainable development. According to the new models of the manufacturing industry, it is the materials themselves which are becoming the first step in increasing the value of products and their performance, rather than the production steps.

Research will focus on 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. nanocomposites), 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 materials phenomena, in particular the structure–property relationships at different scales, to improve materials assessment and reliability including resistance to aging, and to extend the concept of virtual materials for materials design. The integration of nano-molecular-macro levels in chemical and materials technologies will be supported for developing new concepts and processes such as in catalysis, and in process intensification and optimisation. Issues related to process development and scaling-up and industrialisation of high added value materials will also be addressed, as these are essential in many sectors of European industry.

Materials are key for today's technological advances and therefore their applications are highly relevant to all the other FP7 Themes. Theme NMP mainly focuses on advanced materials design, development and processing, while other Themes are more concerned with research related to the use of materials in their respective fields of application.

4.2.1 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-2007-2.1-1 Nanostructured polymer-matrix composites

Technical content / scope: Nanostructured composite materials are emerging as an area with great promise, in particular in the case of polymeric matrices having, for example, nanostructured clays and ceramics as fillers. These polymer nanocomposites exhibiting radically enhanced properties require a lower filler loading than composites using traditional fillers, resulting in markedly improved performance at a lower density. Major areas where research is required are the chemical interaction of nanofillers with the polymer host as well as the composite processing with uniform dispersion (e. g. in exfoliation) and the thermal stability of polymer nanocomposites using, for instance, layered silicates and carbon nanotubes or nanofibres as nanoinclusions. Approaches are expected to consider the combinations of matrices and potential reinforcing nanoelements with

different chemistry, size, shape and properties, as well as the processing techniques, in order to obtain radically enhanced mechanical and physical performance, based on a thorough understanding of the fundamental mechanisms. Attention should also be paid to the life cycle analysis, to the safety issues related to the use of nanofillers, and to the cost effectiveness of the nanostructured composite materials in comparison to the materials currently used.

Funding scheme: Large scale integrating collaborative projects.

Special features: Industrial leadership is expected. This research area is particularly well suited for cooperation with Third Countries (e.g. United States, Russia, China, India).

Expected impact: Nanostructured composites have the potential for enhanced product characteristics, such as improved thermal stability and fire retardancy, biocompatibility, increased mechanical strength and improved barrier properties for many industrial areas, including the biomedical, optoelectronics, construction, maritime and automotive sectors, where improved performance at a reduced cost and weight are important.

NMP-2007-2.1-2 Nanostructured coatings and thin films

Technical content/scope: The advent of nanotechnology has enabled tailoring the structure of coatings and films at the nanoscale, subsequently producing a radical enhancement of their performance. Research is required for the development of nanoreinforced ceramic and metallic coatings and their processing technologies in order to produce major improvements regarding high strength, high ductility, adhesion or excellent impact resistance. The projects should consider the development of novel nanostructured coatings and thin films with markedly enhanced properties such as high hardness, chemical inertness (e.g. oxidation, corrosion), UV resistance, bioresistance and improved wear behaviour, as well as the study of novel structures, surface modification, multilayers, and a new generation of solid lubricants and tribological materials. Electronics and photonics applications are not included. The proposals should deal with safety and life-cycle issues and include an evaluation of the cost effectiveness of the nanostructured materials.

Funding scheme : Small or medium scale focused collaborative projects.

Special features: Industrial participation is required.

Expected impact: Nanostructured coatings and thin films are crucial for a variety of industrial uses, such as improved tribological materials for the mechanical industry in e.g. engine parts and drilling tools, and for new multifunctional films with wide applicability.

NMP-2007-2.1-3 Characterisation of nanostructured materials

Technical content/scope: The field of nanostructured materials has witnessed quite remarkable progress in recent years, with many different types of nanomaterials being synthesised for potentially wide industrial applications. Advanced characterisation methods to determine their structure and properties are essential for the development and processing of these nanostructured materials. Moreover, many new characterisation techniques are not well known or are unaffordable for SMEs active in nanomaterial production. European-wide efforts are needed to compile the characterisation techniques that are in use or should be developed to support further nanomaterial development, in particular, the design of intrinsically safe nanomaterials. The coordination actions should focus on the identification and co-ordination at European level of dissemination and development actions to allow researchers and nanomaterial producers, in particular SMEs, to be well aware of the state-of-the-art in characterisation tools for nanostructured materials. Harmonisation work for potential standards in the field of characterisation of nanostructured materials should also be considered.

Funding scheme: Coordination and support actions aiming at coordinating research activities.

Special features: None

Expected impact: Dissemination of novel techniques and preparation of standards in the field of nanomaterials characterisation. For example, it is very common for nanoparticles to be characterised only in terms of particle

size (SEM) and reactivity (specific surface) with no consideration of the structure-properties relationship at the relevant length scale. This is even more pronounced if nanocomposites, hybrid systems and interface behaviour are considered. Increased take up of nanomaterial characterisation methods beyond using just particle size and reactivity would be expected in particular for SMEs. Development of, or preparatory work for, new standards in the field of characterisation of nanostructured materials.

4.2.2 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 tunable dielectrics. The main objective is to design novel knowledge-based smart materials with tailored properties, releasing their potential for enhanced and innovative applications.

NMP-2007-2.2-1 Organic materials for electronics and photonics

Technical content/scope: Organic materials are starting to release their huge potential in the electronics and photonics industry. New developments in polymer based electronics and photonics (e.g. flexible display technology and lighting), and related photovoltaic innovations, rely to a large extent on new organic materials development. Research should focus on enhancing the materials performance and, in particular, on enabling further progress on low cost processing and large area challenges. Projects should aim at the development of nanostructured organic multifunctional materials with tailored electronic, optical and sensing properties, to be used in applications such as flexible organic devices for electronic labels, electronic paper, optoelectronic devices, light emitting diodes, solar cells, displays and stimuli-responsive materials (sensors and actuators). In particular, controlling the structure of materials at the nanometer scale is important to increase carrier mobility, spectral (emission and absorption) tuning, interface matching, life-time improvement and reliability. Material processing technologies warranting attention include patterning, multilayering, self-assembly, molecular separation and recognition, vapour growth techniques, selective laser treatment, and deposition at surfaces and interfaces leading to low cost and low temperature solutions (e.g. soft-lithography, dip-pen lithography, self-assembled monolayers and molecular imprinting).

Funding scheme: Large-scale integrating collaborative projects

Special features: In line with the objectives of this topic, adequate industrial participation is recommended.

Expected Impacts: Competitiveness of the electronics and photonics industry, for example utilising the potential of roll-to-roll technologies for processing large areas. The development of cost effective organic electronic and photonic devices competitive in performance to alternative technologies is expected. Developments in photovoltaics for energy applications would also bring, for instance, an increase in efficiency and improvement in stability, e.g. by controlling self-thermal degradation.

NMP-2007-2.2-2 Nanostructured materials with tailored magnetic properties

Technical content/scope: Magneto-opto-electronics is an emerging field with radically new technologies that exploit the electron charge as well as the magnetism of its spin for the realisation of novel devices. Understanding magnetic phenomena in the nanoregime and their coupling to optical and electronic phenomena is still in its infancy, but presents a huge potential for the information society. Research should deliver solutions beyond the current state-of-the-art in technology areas such as spintronics, magnetic data storage/processing, photonics and sensors for medical applications. The nanostructured materials targeted

include molecular nanomagnets, magnetic nanoparticles, complex geometries like core-shell structures, engineered highly polarised spin sources, systems where the manipulation of magnetisation is carried out by electric fields, current, or light, magnetoresistive or magnetostrictive materials and diluted magnetic semiconductors.

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

Special features: Industrial participation is required.

Expected impacts: Relevance in technological fields like magnetic data storage and processing, scanners, spintronics, photonics, sensors for medical and other applications.

NMP-2007-2.2-3 Advanced material architectures for energy conversion

Technical content/scope: The development of new energy converters (solar, thermo-electrical, electrochemical) involves increasingly complex material architectures in order to control, in particular, the specific surface area, porosity, reactivity, cyclability and durability of such devices. Research should aim at radically new materials and synthesis approaches based upon the control of complex architectures, e. g. made with quantum dots, nanocomposites, thin-films, mesoporous 3-D architectures, carbon and inorganic nanotubes, aerogels and ionogels. The materials developed should provide improved efficiency and competitive cost/efficiency ratios for example in applications for supercapacitors, stacks, solar cells and high performance batteries.

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

Special features: Industrial participation is required.

Expected impact: The complex architectures developed should have the potential to be integrated into functional devices (e.g. stacks, super-capacitors, solar-cells and batteries).

4.2.3 Novel biomaterials and bioinspired materials

Biomaterials are nowadays essential for improving human health and quality of life. Originally foreseen with an aim to minimise 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-2007-2.3-1 Highly porous bioactive scaffolds controlling angiogenesis for tissue engineering

Technical content/scope: In recent years biomaterials based on porous scaffolds have proved to be effective for bone and cartilage regeneration, showing that they are very promising for medical applications, in particular in the treatment of spinal disorders. However, existing biomaterials are not able to control cell differentiation and to achieve angiogenesis and cannot be adequately injected into the body. Therefore, there is the need to design highly porous but structurally sound bioresorbable tissue-engineered scaffolds able to be functionalised and to have direct influence on cells behaviour. Bioactive scaffolds are also required for the engineering of other complex tissues (e.g. nervous, ocular, visceral, nephrological-urological, vascular). The focus should be on advanced bioactive scaffolds enabling internal growth of tissue and the site specific delivery of bioactive signalling factors (temperature, pH, concentration, internal stimuli, etc). The approaches are expected to include

issues such as delivery devices (e.g. injection), remodelling of large bone defects and improved tissue-biomaterial interfaces .

Funding scheme: Large scale integrating collaborative projects.

Special features: In line with the objectives of this topic, adequate industrial participation is recommended.

Expected impact: Medical applications (bones, joints, blood vessels etc.) improving health and quality of life, using biomaterials which are able to control cell differentiation and can be successfully injected into the body. Competitiveness of the European biomaterials industry.

4.2.4 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, flexible and efficient materials processing.

NMP-2007-2.4-1 Flexible efficient processing for polymers

Technical content/scope: Increasing energy and raw material costs are changing the worldwide market for polymeric materials and for plastic processing. Alternatives to current plastic processing, e.g. involving natural feed stocks, are expected to become increasingly competitive. Flexible polymer processing using energy efficient curing methods (e.g. microwaves) and a diversity of raw materials are essential for radical innovation in the sector. New processing methods for speciality polymers which are radically more cost efficient because of resource savings are also required. The projects should focus on finding flexible and energy-efficient processing approaches with a smart use of materials (saving resources and tailored to the application) in an environmentally friendly manner. Research is needed on highly energy efficient processes (e.g. integrating treatment, compounding, cleansing and processing, precise microprocessing with lasers) and use of alternative energy sources for plastics processing and polymeric materials (e.g. UV, microwave, optical microprocessing). Polymer nanocomposite processing is excluded.

Funding scheme: Collaborative projects targeted to SMEs.

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 fields. Research and innovation activities need to be covered by the projects. In each project, at least 35% of the EC contribution is expected to be allocated to the participating SMEs. The projects will be led by SMEs with R&D capacities but the coordinator does not need to be an SME. The participating SMEs should have the decision making power in the project management. The output should be for the benefit of the participating SMEs and the targeted SME dominated industrial communities.

Expected impacts: In today's global market, polymer processing in Europe needs to be highly efficient and flexible to keep up with competition from other parts of the world and the pressures on supply of energy and raw material resources. New polymer processing methods, e.g. using natural feed stocks and renewable resources, are expected to be developed that are cost effective and require a smaller amount of resources.

NMP-2007-2.4-2 Nanostructured catalysts with tailor-made functional surfaces

Technical content/scope: Innovative sustainable chemical processes having higher energy efficiency and ideally 100% selectivity, require the development of a new generation of catalytic materials with tailored functionality at the surface. Interdisciplinary efforts including from advanced characterisation and modelling to reactivity and kinetics, are expected to enable the mastering of highly complex catalytic processes on the basis of a controlled sequence of surface reactions and of active sites. Structuring the catalyst in terms of nano-reactors and hierarchically organised nano-structures will allow control of the multiscale factors determining reactivity and exploring new functional properties. The focus should be on long term highly innovative research combining these aspects and able to integrate homo-, bio- and heterogeneous catalytic concepts to realise novel catalytic materials.

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

Special features: Industrial participation is required.

Expected impact: Achieving zero-waste emissions, selective and highly efficient chemical reactions, new bio-mimicking catalytic transformations, new clean energy sources, reducing greenhouse gas emissions and improving water and air quality are some of the challenges for the future. Overcoming these challenges will be of crucial importance for the environment, social and economic development and the future industrial competitiveness in Europe as more than 80 % of the processes in the chemical industry depend on catalytic technologies. The development of innovative sustainable chemical processes having higher energy efficiency and close to 100% selectivity is expected.

NMP-2007-2.4-3 Renewable materials for functional packaging applications

Technical content / scope: Innovative renewable materials (e. g. wood or vegetable based) and their ecoefficient processing are required to provide novel entirely-renewable functional packaging solutions for a global market. Important drivers for innovation using life-cycle approaches in these renewable packaging materials are cost reduction, improved functionality, higher flexibility and prolonged shelf life of packaged consumer goods like seafood by improved barrier (e.g. active, antimicrobial, permselective, intelligent adaptive) performance. Smart features such as displays or sensors can be incorporated into packaging materials using ink and printing technologies that allow for low production costs. The focus should be on the design and processing of innovative, renewable packaging materials as well as on the interactions between different types of renewable materials, e.g. in multilayer packaging, using the latest developments in nanotechnology. Special emphasis should be put on material performance (e.g. functionality, surface strength, moldability, chemical and microbiological safety, biodegradability, hydrostability, moisture resistance and microbiological immunity). Materials processing should display low emissions, reduce the use of chemicals, but enhance the use of "green" biotechnological alternatives in the manufacture and treatment of packaging materials and printing inks.

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

Special features: Industrial participation is required.

Expected impact(s): From product storage and distribution to waste disposal and environmental degradation of packaging materials. Packaging is a high volume business close to the consumer where demands for a sustainable transformation will continue to increase. A contribution towards the overall target of reducing greenhouse gases and the dependency on petroleum resources is expected.

4.2.5 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-2007-2.5-1 Novel materials tailored for extreme conditions and environments

Technical content/scope: Materials especially tailored for extreme conditions and environments, which are resistant to very high or very low temperatures, radiation, high pressures, high electromagnetic fields, damaging chemical reactions such as corrosive or oxidising environments, biodegradation, or several of these conditions at the same time, are becoming increasingly important in a variety of industrial fields. Research should focus on radical innovations in the properties and processing of bulk or surface treated materials designed for extreme environments, based on an enhanced understanding of materials degradation. Composite materials, metallic materials, and engineering ceramics need further development, but also new alternatives are sought for wide industrial applications (e.g. turbines, engines, aerospace and maritime applications, machinery, sensors and the chemical industry).

Funding scheme: Large scale integrating collaborative projects.

Special features: In line with the objectives of this topic, adequate industrial participation is recommended.

Expected impact - Novel materials for extreme environments can offer increased durability of surfaces and products (e.g. in energy production, chemical or petrochemical industry and aerospace applications), contributing to a decrease in the risk of industrial hazards and an increase in safety. Step changes in the understanding of materials degradation mechanisms in extreme environments are expected.

NMP-2007-2.5-2 Modelling of microstructural evolution under work conditions and in materials processing

Technical content/scope: Modelling of material performance has nowadays become a very powerful tool, complementing experimental research. The simulation of the microstructural evolution of materials properties and phenomena that determine the macroscopic material response under working conditions and during materials synthesis and processing (e.g. in hot deformation, mixing, injection moulding, filament processing, laser processing, near to shape production) can enable the achievement of major improvements in materials design and life cycle assessment. Modelling approaches are expected to build on the link between microstructural evolution and specific macroscopic material properties and take advantage of the new multi-scale approaches. Essential reduction of costs and energy consumption for new materials development and industrial processing is expected. The experimental validation of the modelling approaches is also expected to be part of the projects.

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

Special features: Industrial participation is required. This research area is particularly well suited for cooperation with Third Countries (e.g. United States, Russia, China, India).

Expected impact: Increase of the competitiveness of European industry, by developing validated predictive models aimed at reducing the efforts required for the development of new materials, including newly emerging nanostructured materials, for flexible production of knowledge-based products.

II.3 Activity 4.3 New production

A new approach to manufacturing is required for the transformation of EU industry from a resource intensive to a sustainable knowledge-based 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.

4.3.1 Development and validation of new industrial models and strategies

The key objective is the development of concepts for "knowledge-based factories as products", which are capable of adapting themselves continuously to the requirements and tasks of changing market requirements or changing product- and production technologies. This involves the development and validation of new manufacturing and business models covering all aspects of product and process life-cycle, including but not limited to a full risk assessment at each critical stage of the life cycle, enhancing the European industries opportunities to compete and grow in the global market place. The research also focuses on the integration of reconfigurable technical systems and processes with factory level systems; integration of technical intelligence from sensors and actuators; and efficient systems networks based on standards. The scope includes discrete manufacturing and process industries, as well as construction and its associated industries.

NMP-2007-3.1-1 Beyond Lean Manufacturing – New Industrial Models for Product and Process Life Cycle

Technical content / scope: The main objective is to develop a new European production model, which takes the Lean Manufacturing paradigm further by incorporating the relevant parts from the European manufacturing culture (including sustainability objectives), standards and technology. This production model should apply human resources and technological factors for optimal leanness and agility (as the demand for customised products is increasing) and to maximise value creation throughout the product life cycle. Among key development issues are: tool and methodological support for a production model which balances reactivity and efficiency; solutions supporting continuous adaptation which integrate the systems and processes of suppliers and customers (based on European "standards" and open architectures); tools for dynamic systems and process modelling providing improved synchronisation between reality and model; tools for highly responsive manufacturing systems design, delivering systems with optimum complexity. Deliverables will take the form of pilot implementations, demonstrating the new model and the developed tools in an industrial setting, formulating effective strategies for the adoption of new production models and clarifying also potential (non-technical) barriers. Synergies, coordination and collaboration with the ICT thematic priority and in particular Objective 3.3.2.3 (Networked Embedded and Control Systems), will be sought, where appropriate.

Funding scheme: Large-scale integrating collaborative projects

Specific features: The topic is aimed at industrially driven projects with significant demonstration, technology transfer and training elements. Funded proposals are collectively expected to cover a number of manufacturing sectors (with distinctive life cycles), such as: automotive, aeronautics, machinery, minerals and white goods sectors, effectively integrating the key players of the supply chain throughout the product life cycle. Point solutions, or partial solutions, e.g. proposals focussing on process modelling alone are excluded.

Expected impact: The new production model is expected to allow companies to change their strategic and product focus quickly in response to market trends and demands and to develop distinct core competencies. Wide scale application of the new model and tools is expected to increase the added value and productivity throughout, and in particular in the SME elements of the supply chain, through increased production capability, capacity and responsiveness, improved manufacturability, quality, usability, reliability and product life-cycle management as well as decrease in raw materials and energy consumption.

NMP-2007-3.1-2 New added-value user-centered products and product services

Technical content/scope and deliverables: The objective is to improve the long term competitiveness of the European manufacturing industry by adopting more user driven innovation modes that allow for integration of customers and users into all phases of the value adding chain. The markets increasingly demand customised products that fulfil not only one but several criteria for customisation ranging from strict technical functionality to emotional aspects, to improved quality of life, public health, safety and environmental protection, while imposing short delivery times. On the other hand, a continuous shift of business is taking place towards product services, capable of fulfilling specific users' demands. Customers and users must therefore have flexible means for participating in the creation phase of product-service systems and these solutions must be seamlessly integrated with production scheduling, highly advanced manufacturing process technologies, delivery logistics etc. Companies also need to adopt new organisational solutions and develop specific skills for realising continuous interaction with customers.
The research should therefore focus on the synergistic integration of the diverse aspects of this production model, including: customer interface facilitating assisted product and product service creation; data flows and standards for product data; manufacturing technologies capable for the automated production of products in small to single piece batches integrating user characteristics needs and desires, delivered just in time. This includes the integration of the manufacturing of the piece itself as well as its decoration, surface treatments and/or the addition of functionalities linked to the digital world.
Deliverables will take the form of pilot implementations in an industrial setting, covering consumer products oriented sectors and demonstrating the feasibility of the concept.

Funding scheme: Collaborative projects targeted to SMEs

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. Research and innovation activities need to be covered by the projects. In each project, at least 35% of the EC contribution is expected to be allocated to the participating SMEs. The projects will be led by SMEs with R&D capacities but the coordinator does not need to be an SME. The participating SMEs should have the decision making power in the project management. The output should be for the benefit of the participating SMEs and the targeted SME dominated industrial communities. Proposals only focussing on product-service design issues are excluded (covered by topic NMP-2007-3.3.-1). The consortia should include all the key players in the product supply chain (although this is an SME dedicated topic, OEMs falling outside the SME definition are nevertheless eligible to participate.)

Expected impact: Strategic impacts for the SME manufacturers include: realisation of maximum value at minimum time through knowledge management; capability to operate flexible and interdisciplinary product teams as well as testing and validating cooperative and strategic partnership arrangements, creating new business opportunities; creating total management of customers-based innovation processes. A positive

contribution to sustainability is also expected as overproduction can be avoided (products manufactured on demand) and due to longer product lifespan.

NMP-2007-3.1-3 Integrated risk management in industrial systems

Technical content / scope: The value chain based production activities have become more complex with more interrelations and interdependencies, and with new technologies and materials that introduce new risks in a changing environment, while at the same time society is becoming more risk averse. The shift to a new safety paradigm is therefore required. The main target is the development of integrated methodologies for risk assessment and management addressing complexity (including multi-hazard and natural-technological hazard situations), multifunctional use of space and increasing population densities with the aim of reducing overall risk and detrimental impact to society. Approaches should be based on societal cost-benefits to reduce impact on human health and environment. Integration of new safety concepts related to technical, human (ergonomics), organisational and cultural aspects and building on-line risk assessment that will continuously monitor the interactions in the industrial systems during their Life Cycle will lead to a new safety paradigm and radical health and safety improvement.

Deliverables include integrated approaches and solutions for the total safety of industrial systems and networks especially of those with serious potential impact in terms of injuries, casualties and economic loss, or in terms of societal concerns. Cost-efficient technical and organisational solutions for known problems to reduce risks of hazardous processes or products will be developed, including preventive and protective technologies, user-adaptive intelligent systems, human-centred design production systems, risk-based methodologies, impact assessment on the economy, society, the environment and health, systems for data collection, new monitoring techniques and methods, new training methods and technologies addressing the increasing needs for competencies, transfer of new knowledge, and life long learning systems of the workers and managers responsible for safe operations.

Funding scheme: Large-scale integrating collaborative projects

Specific features: The topic is aimed at projects driven by industry and service-to-industry companies, with significant demonstration elements. Funded proposals are collectively expected to cover a number of industrial sectors and involve main stakeholders. Projects are expected to create a leverage effect through successful technology demonstration, technology transfer, underpinning standardisation and training activities. International collaboration, in particular within the IMS scheme, is encouraged.

Expected impact: New models for industrial systems that take into account interdependencies during the design and operation phases will be transformed in safety technologies, standards and services that will generate a new lead market for Europe. Wide adoption of the new health and safety paradigm based on integrated approaches and solutions will bring by 2020 significant progress towards accident-free networked production through structured, self-sustainable, self-organising, knowledge-based and self-regulated safety programmes in all industrial sectors impacting social sustainability[4]. The adoption of this new safety paradigm will improve industry competitiveness as well as transforming Europe towards a more risk informed and innovation accepting society.

[4] Research efforts will be underpinning EU policies on industrial safety, mainly the Health and Safety at Work directive (89/391/EEC 12/6/1989) and the HSW action plan (COM(2002) 118 final), the Major Accidents Seveso II directive (96/82/EEC 9/12/1996), the Explosive Atmospheres ATEX directive (99/92/EC), and the Integrated Pollution Prevention and Control IPPC directive(96/61/EC 24/9/1996).

4.3.2 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. Synergies, coordination and collaboration with the ICT thematic priority and in particular Objective 3.3.2.3 (Networked Embedded and Control Systems), will be sought, where appropriate.

NMP-2007-3.2-1 Rapidly configurable machines and production systems

Technical content / scope: The main objective is to create radically new, self-adaptive machine structures with online self-optimisation based on mechatronic concepts. The knowledge-based intelligent modules can feature multi-layer control, sensing and actuator structures with a high level of redundancy which guarantees a high level of reliability and allows optimal performance of a production system under different conditions. Innovation lies in moving from current 'assembled' sensor, actuator and control system architectures towards mechatronic knowledge-based systems.

The research should initially focus on the development of "adaptronic" modules and interfaces and their integration in intelligent manufacturing equipment through the development of active intelligent components (integrating, as appropriate, sensors, actuators, control, mechanical structures); development of tools for integrated/embedded optimised system configuration based on mechatronic modelling and simulation with respect of the resulting performance (including damping characteristics, working envelope, etc.). Deliverables include (i) tools and methods for an adaptive, mechatronic manufacturing system and components modelling, set-up and use; (ii) prototype adaptronic modules and applications of their usage in machines and production systems.

Funding scheme: Small or medium-scale focused research projects

Specific features: Proposals are expected to be industrially led and to include component manufacturers and OEMs (Original Equipment Manufacturers) for ensuring market take-up of the new technologies. Proposals are also expected to take into account relevant standardisation and interoperability issues.

Expected impact: New generation of products helping European instrument manufacturers and machine builders to stay ahead of the competition. Reduction of time needed for reconfiguration and maintenance, yielding a significant increase in productivity for small batch production. Better process control allowing a considerable reduction in resources consumption (both energy and raw materials).

NMP-2007-3.2-2 Process intensification in chemicals production

Technical content / scope: New research enabling safe and sustainable chemicals production must cover a much broader range of production scales and production applications, and development must move from individual devices to complete integrated production systems. Widespread application of intensified production requires devices operating under a broad range of conditions and truly novel synthetic routes for more effective production. Issues both in scale-down for 'ultra' small-scale production of extremely high value-added products early on in the development stages (pharmaceuticals for clinical trials, etc.), as well as scale-up for 'precision engineering' of product end–use properties (such as droplet and grain–size distributions, crystalline

polymorphism, isomeric ratios, etc.) for high-tonnage sectors through locally targeted process control (integrated sensors and actuators) need to be addressed.

Research should initially target a new generation of extremely flexible, high–performance process equipment, developed through integration of self–adapting materials (shape–change alloys to create 'intelligent' valves, piezo–electric components, etc.), having the long-term goal of developing programmable chemical reactors whose local operating conditions adapt automatically and real-time to changes in feed composition, operating conditions, product specifications, etc. Another major challenge is the invention of methods for the continuous processing of highly viscous and/or solids–containing process fluids in intensified devices, as well as the development of dedicated, small, continuous processes at a reduced cost.

Funding scheme: Small or medium-scale focused research projects

Specific features: The ultimate goal will be the integration of technologies within large scale projects for an intensified and safe and flexible chemical factory.

Expected impact: The funded projects are expected to enhance the sustainability of chemicals production in areas such as: resources use minimisation & improved eco-efficiency and increased safety. This will be the result of the development of concurrent process- product engineering methods, coupled with the emergence of a new generation of equipment manufacturers, capable of producing the required devices and standardised components at affordable costs. In the longer term a substantial drop in capital expenditure for new plant and/or for retrofit of high–performance intensified devices into existing infrastructure can be expected.

4.3.3 Networked production

The key objective is to support highly dynamic networked production through the development of tools and methods for co-operative and value-added operations for global production capability, including the design and innovation of high value-added products. Collaborative design, identification and verification of manufacturing requirements of all involved parties, determination and specification of processes as well as ICT systems are among the required key competencies. The research focus is on design innovation, network configuration, partner identification & partner development, networking, ramp-up, operation, optimisation and support for advanced decision-making. Synergies, coordination and collaboration with the ICT thematic priority will be sought, where appropriate.

NMP-2007-3.3-1 Innovative customer-driven product-service design in a global environment

Technical content / scope: Intelligent customer driven innovation focuses on the integration of customer influence in the design and development process and the related demands of the manufacturing and logistic processes. Moreover, multi-site and multi-nation product development is becoming more and more an international business. Companies will design products, including the production systems and even factories themselves, for customers all over the world. They will also develop and manufacture these products with partners and suppliers from all the continents. Intelligent customer-driven innovative product-service design in a global environment is set for new challenges, such as culture specific customer preferences, location specific production technology and logistics, round the clock 24-hour collaborative development, different cultures, attitudes and procedures for participating companies. The expected deliverables are: validated tools for cost-effective and rapid creation, management and use of complex knowledge-based product-services that combine the customer-driven approach with enablers for competitiveness at internationally networked locations; tools facilitating collaborative design in temporary partnerships; and new business and management processes in virtual company networks around the world.

Funding scheme: Small or medium-scale focused research projects

Specific features: Proposals should take note of the available de-facto standard design tools and avoid unnecessary re-development. The consortia should include lower tier suppliers, the majority of which are SMEs. The topic is a precursor for future large-scale collaborative projects addressing product creation and production in non-hierarchical company networks. International collaboration, in particular within the IMS scheme, is encouraged.

Expected impact: Considerable reduction of time-to-market for new products is expected in the next 5-7 years, for example in the machinery and white goods sectors, with a significant positive influence on product quality and improved business relations in a global context. The funded projects will also enable SMEs to achieve the critical mass required to compete for major orders, and to focus on needs for mass customisation of products in the 21st century.

4.3.4 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.

NMP-2007-3.4-1 Rapid manufacturing concepts for small series industrial production

Technical content / scope: The Rapid Manufacturing (RM) concept is based on solid freeform manufacturing technologies for the direct automated production of bespoke parts and products in small to medium size batches (without resorting to specific moulds and tools). The RM processes are not yet established in the production environment, so currently there exist only very few process solutions of RM parts for the market need of bespoke parts and appliances. RM is a multidisciplinary field requiring close interaction between design, material, technology and ICT. Implementation of RM concepts will enable the transition from mass production to the personalised/customised, for instance in the field of micro-nano fabrication, need-oriented and eco-efficient manufacturing requirements of the future. The research should focus on innovative RM processes with integrated materials design and simulations to be run prior to building the actual personalised part to guarantee functionality, process optimisation, repeatability and "first time right", sustainable manufacturing.

Funding scheme: Collaborative projects targeted to SMEs

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. Research and innovation activities need to be covered by the projects. In each project, at least 35% of the EC contribution is expected to be allocated to the participating SMEs. The projects will be led by SMEs with R&D capacities but the coordinator does not need to be an SME. The participating SMEs should have the decision making power in the project management. The output should be for the benefit of the participating SMEs and the targeted SME dominated industrial communities. For this topic, the proposals should address diverse industrial sectors and the consortia should include technology and service providers as well as end-users ranging from the individual to large OEMs. The proposals should include significant demonstration elements, showing the viability of this new technology in conventional production chains for more than one industrial sector.

Expected impact: It is expected that the removal of technical barriers will open the way for wide-scale introduction and approval of rapid manufacturing technologies in the market place for high value added products (replacing 5-15% of the conventional production techniques within the next 5-10 years), in a wide range of sectors, such as automotive, aerospace, instruments, spare parts, consumer goods and Micro-Electro-Mechanical Systems (MEMS), significantly shortening the processing time and time-to-market.

NMP-2007-3.4-2 Innovative pathways in synthesis - improving efficiency by smart synthesis, design and reduction of the number of reaction steps

Technical content / scope: Innovative pathways in synthesis cover the whole range of chemistry, including novel transformations, application and production of alternative feedstocks, new reaction media and reaction conditions (such as environmentally friendly solvents, supercritical conditions), and/or innovative cheaper, shorter or more benign pathways to known products. They should not be treated in isolation but integrated in a holistic manner with equally advanced reaction engineering concepts. Novel synthetic pathways could therefore benefit, especially from advances in catalysis and process intensification.

The development focus should be given to the reduction of the number of intermediate reactions steps. The production of fine chemicals involves usually the generation of very complex molecules with very high value via a series of intermediate steps. In addition, each step may generate undesired side-products. Aiming at ecoefficiency and optimal use of intermediate reageants, the reduction of reaction steps could for example be tackled using the latest state-of-the-art synthetic routes, such as introducing catalytic steps instead of stochiometric ones and circumventing the necessity to protect and deprotect functional groups in organic synthesis.

Funding scheme: Small or medium-scale focused research projects

Specific features: Taking into account the portfolio of EU projects currently under execution, the area of ionic liquids is not seen as a priority in this call.

Expected impact: The main impacts are at the level of environment and quality of life, with a significant reduction of wastes and energy consumption. In addition, traditional economy of scales and reduction in capital investment are expected in the long run.

4.3.5 Exploitation of the convergence of technologies

The key objective is to stimulate the creation of new industries by facilitating the design, engineering and manufacturing of the next generation of high value-added products, exploiting the opportunities, integration and convergence of, for example, micro- ,nano-, bio-, info- and cognitive technologies. The research focus is on the application of basic research results for the development of new manufacturing processes for new science based products in order to create potentially disruptive products and production systems. Environmental technologies, adaptive and functional materials, cognition based control, intelligent mechatronic systems and process technologies are examples of possible application fields and there is a strong focus on micro and nanomanufacturing. Synergies, coordination and collaboration with the ICT and Bio thematic priorities will be sought, where appropriate.

NMP-2007-3.5-1 Processes and equipment for high quality industrial production of 3-dimensional nanosurfaces

Technical content / scope: The objective is to up-scale and stabilise "surface functionalisation" processes with respect to throughput, yield, quality and cost efficiency. The focus is on 3-dimensional nanostructuring at the surface or the fabrication of surface structures with typical dimensions or phases smaller than 100nm on various solid materials, e.g. metals, ceramics, glasses, semiconductors and polymers. The structure can be

topographical, presenting designed nanostructures (e.g. pores, pillars, gratings) tailored for a specific application resulting in outstanding properties, and may also involve coatings having phase modulations, crystal sizes, embedded particles in the mentioned range. Technology convergence of top down and bottom up for new hybrid methods of manufacturing may be envisaged. The research activities should focus on increasing the quality/reliability of the structuring processes (e.g. polymer self-assembly, sol-gel texturation, lithography and etching, moulding, hot embossing imprint, high velocity spraying, laser based coating, PVD, PE-CVD) supported by the joint co-development of appropriate quality measures, including surface characterisation equipments and procedures, online control and online control systems. Deliverables should include systematic material design, conception and design of production equipments, contamination control and quality assurance.

Funding scheme: Large-scale integrating collaborative projects

Specific features: Priority will be given to proposals considering the holistic, clean manufacturing system and should clearly demonstrate how nanosurfaces can be processed to a high quality by nanostructuring and coating. Consortia should be supported by the relevant end-user groups in the nano-micro-manufacturing value chain.

Expected impact: A clear strategic contribution to establishing a European high value added nano-manufacturing industry is expected. New, cost efficient production methods will improve/extend the lifetime and quality of products in high market value segments in industries such as aeronautics, automotive, space, electronics, energy and off-shore deep-sea.

NMP-2007-3.5-2 Production technologies and equipment for micro-manufacturing

Technical content / scope: The proposed work should extend the range of microfabrication process capabilities to encompass a wider range of materials and geometric forms, by defining processes and related process chains that can satisfy the specific functional and technical requirements of new emerging multi-material products in the medical/surgical, transport, biotechnology and consumer products sectors. In addition, the compatibility of materials and processing technologies throughout the manufacturing chains needs to be ensured.

The research focus should be on developing and characterising high throughput processes for length scale integration (micro/nano) and the manufacture of components and devices with complex 3D features. Example technologies to be investigated either individually or in combination are: Technologies for direct- or rapid manufacturing; micro-injection moulding; microtooling production, single part manufacturing, energy assisted machining and micro-replication technologies, replication together with methods for qualification and inspection, and functional characterisation that are integrated into "easy and fast" on-line control systems. Deliverables should include processes which demonstrate significantly higher production rates, accuracy, and enhanced performance/quality, creating capabilities for the serial manufacture of micro components and/or miniaturised parts incorporating micro/nano features in different materials. Processes should also provide a higher flexibility for seamless integration into new micro/nano manufacturing platforms.

Funding scheme: Large-scale integrating collaborative projects

Specific features: Proposals must have a clear industrial involvement and a holistic process chain lifecycle coverage with adaptive applications to different types of products and industrial sectors.

Expected impact: The proposed research is expected to show a clear strategic contribution to establishing a European nano- and µ-manufacturing industry, enabling the transfer of laboratory scale manufacturing processes to an industrial scale for the cost effective, automated and high quality manufacturing of new products with new features made possible from research in nano- and µ-science and –technology.

II.4 Activity 4.4 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 footprint.

NMP-2007-4.0-1 Advanced wood-based composites and their production

Technical content / scope: The market price on standard technology wood-based products is increasingly driven by low labour cost countries that have short timber harvesting cycles. The difference in production costs is so significant that improving production efficiency is not sufficient alone to maintain the competitiveness of the European forest-based industry. A strategy for success is to develop new high added value products produced by new resource efficient production concepts.

Wood as a natural and abundant composite can form the basis for a completely new industry based on intelligent recombination of specific physical properties such as heat insulation, conductivity and mechanical strength and shape in engineered wood products (EWP). For example, replacing lignin with silicon, geofiller or ceramics in the wood nano-structure, chemical grafting of cellulose or environmentally friendly chemical densification can yield radically new product properties. New wood and bio-fiber polymer composites (e.g. transformation of wood fibres and thermoplastic resins into wood polymer composites throughout plastic processing, injection moulding, extrusion or pultrusion) show high potential for construction, furniture and packaging applications. The ambitious research objectives include adaptive production concepts for new composites based on wood fibres, cellulose, lignin, or hemicelluloses, and their derivatives; manufacturing technologies such as moulding, shaping, compounding, melt blowing and electro-spinning; new manufacturing methods for sheet structures and converting operations that enable paper to replace non-renewable materials; engineering concepts for cellulose processing, e.g. melting and solid-state processing.

Funding scheme: Large-scale integrating collaborative projects

Specific features: In line with the objectives of this topic, adequate industrial participation is recommended. Although this is not a dedicated SME topic, a significant SME participation is nevertheless expected.

Expected impact: The expected strategic impacts include: (1) placing sustainability at the forefront of cost control and competitive advantage as well as emphasising its role in industry's social responsibility, and (2) addressing Health and Safety issues for both the worker and the consumer through promotion of intrinsically better technologies. More specifically, funded proposals are collectively expected to develop several new product families based on new production concepts that exploit the potential of wood-based composites across a variety of applications in the health, electronics and food sectors, as well as in the fields of construction, furniture, packaging, speciality papers, vehicles and textiles.

NMP-2007-4.0-2 Application of new materials including bio-based fibres in high-added value textile products

Technical content / scope: Intensified research and development efforts, especially from the SME segment of the textiles industry, are required for reinforcing Europe's leadership in the technical textiles field and for establishing the EU as the global lead market for application of innovative textile products. Enhanced fibre properties are the key for improving the properties of these new products and applications in terms of weight performance ratios, strength, durability, flexibility, bio-degradability, energy-efficiency, insulation, temperature and moisture management, permeability, self-cleaning and self-healing. The new materials targeted by the topic are based on natural and bio-based fibres, speciality fibres and fibre-composites.

The research should concentrate on bulk fibres with new or significantly improved properties, novel fibres with tailored functionalities for special applications, natural fibres and bio-based fibres; new processing and production concepts include the development of environmentally friendly and energy-efficient processing and surface modification of fibres, yarns and fabrics to enhance manufacturing of textile- and composite-based innovative products. Deliverables will include the fibre innovation itself, the development of new products and application areas and competitive new processing and production concepts. The main application areas targeted are transport systems, energy systems, agri- and aquaculture, food and packaging applications, machines and other durable equipment, sports and leisure, furniture, home textiles and other similar consumer application sectors.

Funding scheme: Collaborative projects targeted to SMEs

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. Research and innovation activities need to be covered by the projects. In each project, at least 35% of the EC contribution is expected to be allocated to the participating SMEs. The projects will be led by SMEs with R&D capacities but the coordinator does not need to be an SME. The participating SMEs should have the decision making power in the project management. The output should be for the benefit of the participating SMEs and the targeted SME dominated industrial communities. Smart textiles with embedded systems such as sensors and actuators as well as developments with the main applications in building and construction, medical and protective clothing domains **are excluded** from this call.

Expected impact: The expected strategic impacts include: (1) promoting Innovation and the ability of European Textile SMEs to use the results of research; (2) founding market competitiveness on knowledge and added value through highly specific customisation to address specific high-tech markets ideally suited to European Textile high-tech SMEs. More specifically, replacement of currently used traditional textile and non-textile materials in the targeted application areas by at least 20% and an acceleration of currently projected growth rates for technical textile application areas by at least 10% over the next 5 to 10 years.

NMP-2007-4.0-3 Multifunctional materials for future vehicles

Technical content/scope: The design, processing and a more intelligent use of new multifunctional materials, together with improvements in production technologies, are essential in order to combine mobility, sustainability, reliability and safety in future light vehicle design and manufacturing. High added value components with improved performance and tailored properties would strengthen in particular the competitiveness of the automotive industry. These new multifunctional materials, developed in particular with the help of modelling methods, would combine classical with new properties, such as self healing of damage caused by abrasion and wear, variable strength or sensor properties, may contain micro-encapsulated inclusions and would be able to self-adapt their range of properties depending on the requirements during application. A sensing functionality of self-healing materials should enable them to sense their internal state and their external environment, so that they can detect their healthiness or their reduced functionality at specific locations and trigger the self-healing mechanisms. Multifunctional materials should also allow the triggering of safety mechanisms, e.g. based upon the state of the driver. New high performance materials and components should be investigated that contain an inherent ability to be active and reactive through the integration of sensors or actuators (e.g. active materials inside matrix materials, touch sensitive plastics, biodegradable parts with slow surface and fast core).

Funding scheme: Large-scale integrating collaborative projects.

Specific features: Industry participation is essential and SME participation is encouraged.

Expected impact: Maintaining the competitiveness of the automotive and other transport industries. Multifunctional, high performance materials should be developed that can adapt their range of properties depending upon their requirements during application, for example in self-healing (abrasion or wear). These high performance materials should be developed at acceptable costs to allow incorporation into vehicle development and maintain worldwide competitiveness of European transport industries.

NMP-2007-4.0-4 Substantial innovation in the European medical industry: development of nanotechnology-based systems for in-vivo diagnosis and therapy (in coordination with topic HEALTH-2007-2.4.1-7 and HEALTH-2007-1.2-3 in Theme 1 "Health")

Technical content / scope: Within the objective of reinforcing the competitiveness of European industry addressing healthcare and/or medical equipment, proposals are called for with the aim of developing nanotechnology-based targeted delivery systems for in-vivo diagnosis and/or therapy for cardiovascular diseases or neurodegenerative conditions or cancer. They should demonstrate high specificity, efficacy, biocompatibility, and the capacity to cross biological barriers if needed. Where meaningful, research on the combination of diagnosis and therapy (theranostics) in multi purpose systems is encouraged. This call addresses only human healthcare.

Activities should include tests of the in vitro and in vivo behaviour and the fate of the systems (including absorption, distribution, metabolism, and excretion analysis, toxicity, allergic or inflammatory induced response, and biocompatibility), to fundamentally understand the behaviour and pharmacokinetics. Linked animal testing should be kept to the minimum needed and should be replaced by in vitro testing wherever possible. Strong industrial participation is encouraged.

Funding scheme: Large scale integrating collaborative projects.

Specific features: In line with the objectives of this topic, adequate industrial participation is recommended. Activities others than research could be included as appropriate, such as specific education modules, pre- and co-normative activities, or the analysis of existing and required regulations. Gender issues should be considered, where appropriate.

Expected impact: (i) Better and more reliable diagnostics and/or therapy; (ii) delivery of improved health care to citizens and/or livestock; (iii) increased competitiveness of European industry in this high value added and fast growing field.

NMP-2007-4.0-5 Resource efficient and clean buildings

Technical content / scope: The construction industry, as a major industrial sector, must provide a significant contribution to the reduction of resources consumption and to a wider use of renewable resources. The main objective of the topic is to reduce raw materials resources & energy consumption and environmental impact of buildings during their entire life-cycle (80% of energy consumption occurs during service-life).

The main development issues and targets are: new concepts, technologies, design tools and business models for "intelligent buildings", able to significantly reduce or even meet their own energy consumption; improvement of the building energy performance (through cladding and ventilation technologies, sensors and pervasive computing systems, utilisation of embedded renewable energy sources…) at building and at district levels. Developments are also required in new and improved materials and structures to improve the indoor environment as well as resource and climate, energy consumption conversion and storage capacities of buildings. Deliverables include the development, integration and demonstration of the above concepts e.g. for apartment buildings, offices, hospitals, schools, factories or airports. This topic will be executed in collaboration with and complementary to the Environment (including Climate change) thematic priority in relation to technologies for the built environment and cultural heritage.

Funding scheme: Large-scale integrating collaborative projects

Specific features: In line with the objectives of this topic, adequate industrial participation is recommended. The activities under this topic could benefit from the participation of ICPC partners.

Expected impact: As more than 40% of all energy consumption is due to domestic and service sectors, apart from the direct economic benefits, the topic contributes significantly towards meeting the Kyoto protocol obligations and would reduce Europe's reliance on imported energy.

NMP-2007-4.0-6 Innovative added-value construction product-services

Technical content / scope: Buildings retrofitting and maintenance is one of the key activities for the 2.5 million SMEs in the construction sector. The aim is to modernise these traditional SMEs by developing new construction knowledge-based services improving their competitiveness with crucial impact on employment and growth, while ensuring that the SMEs are able to meet all health, safety and environmental requirements.

The main development issues and targets are: The development of knowledge-based construction processes and products deployable by SMEs (in terms of investment costs and human resources), especially for the retrofit, refurbishment and maintenance of buildings; new manufacturing systems (e.g. robots and automation) and ICT infrastructures and tools to develop ubiquitous SMEs access to competitive knowledge; development of new "full" services with a high added value for clients The deliverables are expected to include tools, strategies, services and technologies to ensure a better satisfaction of the end users together with reduction of materials and energy consumption. This topic will be executed in collaboration with and complementary to the Environment (including Climate change) thematic priority in relation to technologies for the built environment and cultural heritage.

Funding scheme: Collaborative projects targeted to SMEs.

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. Research and innovation activities need to be covered by the projects. In each project, at least 35% of the EC contribution is expected to be allocated to the participating SMEs. The projects will be led by SMEs with R&D capacities but the coordinator does not need to be an SME. The participating SMEs should have the decision making power in the project management. The output should be for the benefit of the participating SMEs and the targeted SME dominated industrial communities.

Expected impact: Knowledge-based upgrading and retrofitting of the existing building stock has the potential for significant reduction in resources consumption (energy, water, raw materials). The construction sector achieves a new image of innovation and quality, creating new business opportunities and offering attractive working conditions.

NMP-2007-4.0-7 ERANET on Construction[5]

Technical content / scope: The Era-net on Construction aims at stepping up coordination of research programmes in the fields of construction and operation of buildings. A step towards this aim is identifying RTD priorities in view of implementing joint initiatives, including joint calls.

A specific aspect which could be taken into account relates to the definition of reliable decision-support systems able to demonstrate an optimal balance between sustainability and operational costs of buildings.

Funding scheme: Coordination and support actions

Specific features: See Annex 4. Only ERANET 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 and no two of which are established in the same member or associated state. The participation of new Member States is particularly encouraged. Eligibility requirements are found in the footnote [6]..

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, whose socio-economic relevance is recognised at global level (such as: energy and resource saving; safety; waste reduction etc.); 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.

---

[5] This topic is subject to a joint call for ERANETs across the Themes.

[6] *Eligibility requirements: Activities developed within the ERA-NET scheme consist of Coordination and Support Actions networking research programmes carried out at national or regional level, towards their mutual opening and the development and implementation of joint activities.*

"Research programmes carried out at national or regional level" should be understood as entire research programmes, or parts of such programmes, or similar initiatives. Such programmes should have all of the following characteristics:

a) be strategically planned (i.e. be composed of number of research projects focused on a defined subject area or set of problems, that are scheduled to run for a set period of time and that have a co-ordinated management) ; and

b) be carried out at national or regional level; and

c) either be financed or managed directly by national or regional public bodies, or by structures (e.g. agencies) closely related to or mandated by public authorities

For ERA-NET consortia, the minimum number of participants has been set at three independent legal entities financing (programme owners) or managing publicly funded national or regional programmes, each of which is established in a Member State or Associated country, and no two of which are established in the same Member State or Associated country; It should be stressed that research organisations or scientists are NOT eligible ERA-NET participants. Eligible partners for ERA-NET projects are exclusively contained in the following list :

- Programme owners are typically national/regional ministries/governments responsible for defining, financing or managing research programmes carried out at national or regional level.
- Programme "managers" (such as research councils or funding agencies) are other national or regional organisations that implement research programmes.
- Programme owners (typically national/regional ministries/governments) which do yet not have a running or fully fledged research programme at the moment of submitting an ERA-NET proposal, but which are planning and have committed to set up such a programme, are also eligible if their participation is well justified and adds value to the overall programme coordination. This approach shall help and encourage countries or regions having less diverse research programmes (in particular new Member States) to be integrated in the ERA-NET scheme under FP7.

In addition to the above minimum number of key participants, other organisations may participate :

- Bodies operating at European level (e.g. European Economic Interest Group (EEIG) or any legal entity established in a Member State or Associated State according to its national law and which is made up of independent legal entities) which are managing publicly funded national or regional research programmes from at least two different Member or Associated States if their participation is well justified and adds value to the overall programme coordination.
- Other legal entities (e.g. charities) managing research programmes if their participation is well justified and adds value to the overall programme coordination.

III Calls for Tenders in 2007

- **Project Technical Assistants (PTA)**

Subject: External assistance to enable detailed, prompt, pro-active, and scientifically competent following of the projects by the Commission

Contracts: 33 framework contracts, implemented by specific agreements specifying the projects to be supported, the tasks, and the allocation of resources.

Timing: May 2007 (contracts to be in place before the first projects start)

Budget: 2008 budget (estimate based on 110 projects with an average duration of 4 years, requiring an assistance of an average of 10 days and 2 travels per year).

Ex-post evaluation and impact assessment of RTD funding in the NMP area

Lot 1: Ex-post evaluation and impact assessment for a sample of 200 completed projects of NMP-FP6 (projects selected through stratified sampling on the basis of the PQI scores)

Lots 2 to 5: 4 separate longer term impact assessments of Community funding of research in certain areas / disciplines / sectors where a significant number of projects has been funded over the last 10 years (these areas could for example be: construction, machine tools, biomaterials, nanomaterials)

Lot 6: External assistance to the detailed quantitative and qualitative analysis of the data produced by previous and current evaluation and impact assessment exercises

(this analysis will involve a focus group of which the expert members will be appointed and paid separately by the Commission, using the expert groups procedure)

Contracts: 6 service contracts (of 2 years for lot 1; of 1 year for lots 2 to 5; of 3 years for lot 6)

Timing: launch at the start of FP7

Budget: 1.450.000 € (850.000 € for lot 1; 75.000 € for each of lots 2 to 5; 300.000 € for lot 6)

- **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

(including exploitation related risk analysis at an early stage of the project; generic awareness raising and training sessions; project-specific seminars; first-line innovation helpdesk)

Contract: Framework contract for 4 years, implemented using specific agreements and order forms

Timing: launch at the start of FP7

Budget: maximum € 100.000 in 2007 (the need will increase in later years, as the existing contract for Exploitation Strategy Seminars will end).

IV Implementation of calls 2007

IV.1 Indicative budget (Million €)

		Total[7]	2007	2008 [8]
1st calls				
	Large scale integrating collaborative projects	**295**	200	95
	Small or medium scale focused research projects	**150.723**	105.723	45
	SME-targeted projects	**75**	44	31
	CSA (Coordination and support actions) *	**15**	15	
	ERANET Plus **	**8**		8
Other activities	*- Evaluation (3.50)* *- Calls for tenders (1.550)*	**5.05**	5.05	
General Activities (see Annex 4)	*- Cordis (0.788)* *- Eureka/ research organisations (0.090)* *- Cost (3.376)* *- ERANET (7.096)* *- RSFF (18.140)*	**29.49**	29.49	
TOTAL		**578.263**	399.263	179

** of which up to € 2.5 mio to be allocated to topic:* ***NMP-2007-4-7 ERANET on Construction,*** *which is implemented via a joint call as detailed in Annex 4.*

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

7 The total funding is shown, together with the breakdown of how this is financed through the annual budgets.
8 Under the condition that the preliminary draft budget for 2008 is adopted without modifications by the budget authority.

IV.2 Calls for proposals NMP-2007

- **Call Title: Theme 4 – NMP - Nanosciences, Nanotechnologies, Materials and new Production Technologies**
- **Call identifier**: *FP7-NMP-2007-LARGE-1*
- **Date of publication**: 22 December 2006
- **Deadline**: For Large scale integrating collaborative projects - first stage: 04 May 2007 at 17.00 (Brussels local time)
- **Revised indicative budget: 295 M€**[9] Topics called:

Activity/ Area	Topics called	Funding Schemes
Nanotechnologies and converging technologies	**NMP-2007-1.2-1 Pilot lines to study, develop and up-scale nanotechnology-based processes from laboratory**	**Large scale integrating collaborative projects**
Health, Safety and Environmental Impacts	**NMP-2007-1.3-1 Specific, easy-to-use portable devices for measurement and analysis**	
Mastering nano-scale complexity in materials	**NMP-2007-2.1.1 Nanostructured polymer-matrix composites**	
Knowledge-based smart materials with tailored properties	**NMP-2007-2.2-1 Organic materials for electronics and photonics**	
Novel biomaterials and bio-inspired materials	**NMP-2007-2.3-1 Highly porous bioactive scaffolds controlling angiogenesis for tissue engineering**	
Using engineering to develop high performance knowledge-based materials	**NMP-2007-2.5-1 Novel materials tailored for extreme conditions and environments**	
Development and validation of new industrial models and strategies	**NMP-2007-3.1-1 Beyond lean manufacturing – new industrial models for product and process life cycle**	
	NMP-2007-3.1-3 Integrated risk management in industrial systems	
Exploitation of the convergence of technologies	**NMP-2007-3.5-1 Processes and equipment for high quality industrial production of 3-dimensional nanosurfaces**	
	NMP-2007-3.5-2 Production technologies and equipment for micro-manufacturing	
Integration of technologies for industrial applications	**NMP-2007-4.0-1 Advanced wood-based composites and their production**	
	NMP-2007-4.0-3 Multifunctional materials for future vehicles	
	NMP-2007-4.0-4 Substantial innovation in the European medical industry: development of nanotechnology-based systems for in-vivo diagnosis and therapy (in coordination with topics HEALTH-2007-2.4.1-7 and HEALTH-2007-1.2-3 of Theme 1 "Health")	
	NMP-2007-4.0-5 Resource efficient and clean Buildings	

- **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

[9] This amount includes 95M€ from the 2008 budget, which is added under the condition that the preliminary draft budget for 2008 is adopted without modifications by the budgetary authority.

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: 04 October 2007.

- **Indicative evaluation and contractual timetable**: Evaluation Stage 1 proposals: May/June 2007; Evaluation stage 2 proposals: October 2007. 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.

- **Particular requirements for participation, evaluation and implementation:**

The minimum number of participating legal entities for all funding schemes is set out in the Rules for Participation.

For large scale integrating projects the minimum EC funding requested **must exceed € 4 million**.

In line with the objectives of each topic, adequate industrial participation is recommended.

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**

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

- **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

- **Call identifier**: *FP7-NMP-2007-SMALL-1*
- **Date of publication**: 22 December 2006
- **Deadline:** For collaborative projects - Small or medium-scale focused research projects - first stage: 04 May 2007 at 17.00 (Brussels local time)
- **Revised indicative budget: 150 M€[10] Topics called**:

Activity/ Area	Topics called	Funding Schemes
Nanosciences and converging sciences	**NMP-2007-1.1-1 Nano-scale mechanisms of bio/non-bio interactions**	**Small or medium-scale focused research projects**
	NMP-2007-1.1-2 Self-assembling and self-organisation	
Health, Safety and Environmental Impacts	**NMP-2007-1.3-2 Risk assessment of engineered nanoparticles on health and the environment**	
Mastering nano-scale complexity in materials	**NMP-2007-2.1-2 Nanostructured coatings and thin films**	
Knowledge-based smart materials with tailored properties	**NMP-2007-2.2-2 Nanostructured materials with tailored magnetic properties**	
	NMP-2007-2.2-3 Advanced material architectures for energy conversion	
Advances in chemical technologies and materials processing	**NMP-2007-2.4-2 Nanostructured catalysts with tailor-made functional surfaces**	
	NMP-2007-2.4-3 Renewable materials for functional packaging applications	
Using engineering to develop high performance knowledge-based materials	**NMP-2007-2.5-2 Modelling of microstructural evolution under work conditions and in materials processing**	
Adaptive production systems	**NMP-2007-3.2-1 Rapidly Configurable Machines and Production Systems**	
	NMP-2007-3.2-2 Process Intensification in Chemicals Production	
Networked production	**NMP-2007-3.3-1 Innovative Customer-Driven Product-Service Design in a Global Environment**	
Rapid transfer and integration of new technologies into the design and operation of manufacturing processes	**NMP-2007-3.4-2 Innovative Pathways in Synthesis - Improving efficiency by smart synthesis, design and reduction of the number of reaction steps**	

- **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 13 September 2007.

[10] This amount includes 45M€ from the 2008 budget, which is added under the condition that the preliminary draft budget for 2008 is adopted without modifications by the budgetary authority.

- **Indicative evaluation and contractual timetable**: Evaluation Stage 1 proposals: May/June 2007; Evaluation stage 2 proposals: October 2007. 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.
- **Particular requirements for participation, evaluation and implementation**.

The minimum number of participating legal entities for all funding schemes is set out in the Rules for Participation.

For the small or medium scale focussed research projects the **maximum** EC funding requested **must not exceed € 4 million**.

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**

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

- **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

- **Call identifier**: *FP7-NMP-2007-SME-1*
- **Date of publication**: 22 December 2006
- **Deadline**: For Collaborative projects targeted to SMEs - first stage: 04 May 2007 at 17.00 (Brussels local time)
- **Revised indicative budget: 75 M€** [11]
- **Topics called**:

Activity/ Area	Topics called	Funding Schemes
Nanotechnologies and converging technologies	**NMP-2007-1.2-2 Equipment and methods for nanotechnology**	**Collaborative projects targeted to SME**
Advances in chemical technologies and materials processing	**NMP-2007-2.4-1 Flexible efficient processing for polymers**	
Development and validation of new industrial models and strategies	**NMP-2007-3.1-2 New added-value user-centred products and product services**	
Rapid transfer and integration of new technologies into the design and operation of manufacturing processes	**NMP-2007-3.4-1 Rapid manufacturing concepts for small series industrial production**	
Integration of technologies for industrial applications	**NMP-2007-4.0-2 Application of new materials including bio-based fibres in high-added value textile products**	
	NMP-2007-4.0-6 Innovative added-value construction product-services	

- **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: 04 October 2007.

- **Indicative evaluation and contractual timetable**: Evaluation Stage 1 proposals: May/June 2007; Evaluation stage 2 proposals: October 2007. 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.
- **Particular requirements for participation, evaluation and implementation**:
  The minimum number of participating legal entities for all funding schemes is set out in the Rules for Participation.
  At least 35% of the EC contribution will be allocated to the participating SMEs.
  For SME targeted projects **no upper or lower limits** in EC contribution are applied.
  For this call, implemented via a two stage procedure, the following criteria and thresholds are applied:

[11] This amount includes 31M€ from the 2008 budget, which is added under the condition that the preliminary draft budget for 2008 is adopted without modifications by the budgetary authority.

- 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**

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

- **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

- **Call identifier**: *FP7-NMP-2007-CSA-1*
- **Date of publication**: 22 December 2006
- **Deadline**: For Coordination and Support Actions: 05 June 2007 at 17.00 (Brussels local time)
- **Indicative budget: 15 M€ in 2007 (**including up to € 2.5 million to be allocated to topic: NMP-2007-4-7 ERANET on Construction, which is implemented via a joint call as detailed in Annex 4). A reserve list of projects might be established.
- **Topics called**:

Activity/ Area	Topics called	Funding Schemes
Nanosciences and converging sciences	**NMP-2007-1.1-3 Support to networking ICPC researchers in nanotechnology and creation of a free and open electronic archive of nanosciences and nanotechnologies scientific and technical publications**	**Coordination and support actions**
	NMP-2007-1.1-4 Development of methodology, collection and elaboration of scientific-technical and socio-economic data and studies on nanosciences and nanotechnologies, including risk assessment, and establishment of an observatory	
Nanotechnologies and converging technologies	**NMP-2007-1.2-3 Analysis of the ethical, regulatory, social and economic environment of nanomedicine**	
	NMP-2007-1.2-4 Coordination in nanometrology	
	NMP-2007-1.2-5 Examining capacity building in nanobiotechnology	
Health, Safety and Environmental Impacts	**NMP-2007-1.3-3 Scientific review of the data and studies on the potential impact of engineered nanoparticles on health, safety and the environment**	
	NMP-2007-1.3-4 Creation of a critical and commented database on the health, safety and environmental impact of nanoparticles	
	NMP-2007-1.3-5 Coordination in studying the environmental, safety and health impact of engineered nanoparticles and nanotechnology based materials and products	
Mastering nano-scale complexity in materials	**NMP-2007-2.1-3 Characterisation of nanostructured materials**	

- **Evaluation procedure**: For Coordination and support actions the evaluation shall follow a single stage procedure.
- **Indicative evaluation and contractual timetable**: Evaluation: June 2007. 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.
- **Particular requirements for participation, evaluation and implementation**:

  The topic NMP-2007-4.4-7 ERA –Net on Construction follows the participation requirements foreseen for the ERANET scheme as detailed in Annex 4.

  The evaluation criteria (including weights and thresholds) and subcriteria together with the eligibility, selection and award criteria to be applied to Coordination and Support Actions under this call are given in Annex 2.
- **Forms of grant and maximum reimbursement rates** for projects funded through the Cooperation work programme are given in Annex 3.

ERANET and ERANET Plus topics

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

Activity/ Area	Topics called
Nanosciences and converging sciences	**NMP-2007-1.1-5 ERANET Plus in nanosciences**
Integration of technologies for industrial applications	**NMP-2007-4.0-7 ERANET on Construction**

V Indicative priorities for future call(s)

4.1 NANOSCIENCES & NANOTECHNOLOGIES

4.1.1 Nanosciences and converging sciences

- **Understanding the working of cells**
- **Converging sciences at the nanoscale**
- **Mimicking nature**
- **Nanoscale motors and machines**
- **Deeper understanding of the mechanisms governing the perception of taste and assimilation of nutrients**
- **Qualifying human resources for nanotechnology industry**
- **Development of methodology, collection and elaboration of scientific-technical and socio-economic data and studies on nanosciences and nanotechnologies, including risk assessment**
- **Evolution of ethical, legal and social aspects linked to nano- and converging sciences**

4.1.2 Nanotechnology and converging technologies

- **Novel nanobiotechnology-based processes**
- **Development of cost-effective nanotechnology-based solutions for protecting valuable goods – projects, in cooperation with ICPC third countries**
- **Joint call with Theme "Science in Society"**
- **Stimulating debates and building targeted communication strategies between stakeholders and the public on nanotechnology research and its societal implications**
- **Realisation and circulation in Europe of an EuroNanoTruck and diffusion of information**
- **Citizens' conference on acceptable N&N**
- **Coordination in nanobiotechnology**
- **Converging Technologies for Clean Water**

4.1.3 Health, Safety and Environmental Impacts

- **Research projects (possibly in cooperation with third countries)**
- **Environmental and health impact of nanoparticles and nanotechnology based materials and products**
- **Exposure information throughout the life cycle of nanomaterials, including development of measurement equipment for environmental samples, environmental species exposure and data generation**
- **Critical survey of available data for new chemicals**
- **Updating risk assessment methods and strategies**
- **Development of test methods, physico-chemical properties, hazard information**

4.2 MATERIALS

- **Nanostructured membrane materials**
- **Processing and upscaling of nanostructured materials**
- **Non-Si,Ge based semiconductors for electronics and photonics**
- **Nanostructured Metamaterials**
- **Advanced implants for critical organs such as heart, liver and pancreas**
- **Biomimetic gels and polymers for tissue repair in arthritis and osteoporosis**
- **Development of medical adhesives for joining tissue and wound sealing**
- **Development of novel green solvent systems**
- **Inorganic-Organic Hybrid Materials**
- **Radical advances in the processing of multifunctional films and tapes**
- **Functionally graded materials**
- **Metallic foams**
- **Modelling of interfaces for high performance materials design**

4.3 NEW PRODUCTION

- **Monitoring the implementation progress of European strategic initiatives in industrial technologies**
- **New Consumer Oriented Business Models**
- **Self-learning Production Systems**
- **Improving Quality and Reliability of Intensified Components and Devices**
- **Application of Alternative Forms of Energy for Process Intensification**
- **Process intensification in Metals Production**
- **Industrialisation through new integrated processes**
  - **Industrialised interoperable production systems for off-site and on site production**
- **Scalable Control Systems for Adaptive and Responsive Factories**
- **Manufacturing systems and technologies for 3D production of mass customised products based on flexible materials**
- **Intelligent complex manufacturing systems and equipment for processing and handling biological materials in the food industry (with Theme 'Food')**
- **Supply Chain Integration and Real-Time Decision Making in Non-hierarchical Manufacturing Networks**
- **Interoperability of Technical and Business Solutions in Production Networks**
- **Knowledge-based Manufacturing – Integration of Heterogeneous Data and Enhancement of Human Interactions in Manufacturing Environment**
- **Rapid Design and Virtual Prototyping of Factories**
  - **Development of a Virtual Factory Framework Concept**
  - **Development of Specific Plant and Product/Process Modelling, Simulation and Virtual Prototyping Tools within the Virtual Factory Context**
  - **Integration of VR/AR Technologies in the Virtual Factory**
- **Purification and Formulation Engineering for Added Value Products (non food).**
  - **Formulation of designed products with defined particulate structure- High-throughput tools for formulation engineering**
- **Development of new visualisation, virtual reality and communication tools, advanced ICT systems and multi-dimensional integrated data models for the assessment of the built environment**
- **Advanced Product Engineering Forum to support the development of sustainable processes for targeted and tailored products, such as, intelligent microencapsulated formulations**
- **Robotics for Crop/Forestry Management**

- **Volume production process chains for high throughput micro-manufacturing**
- **Handling and Micro-assembly processes for multi-functional multi-material meso-micro devices**
- **Manufacturing of Nanosurfaces by Surface Functionalisation and Nanolayering**

4.4 INTEGRATION

- **Transnational co-operation among NCPs**
- **Development of new sustainable manufacturing, monitoring and management systems**
- **New business models, advanced methodologies and technologies for innovative tooling industry**
- **High Performance Systems and Processes Adapting to Increasing Demands in Future Manufacturing Industry**
  - **High performance machines and materials processes**
- **High Value Added (HVA) Shoes for Quality of Life, Health and Environment**
- **Innovative Concepts and Processes for New High Added Value Mineral-based Products**
- **Multifunctional construction materials**
- **Integration of Technologies for Intensified Sustainable Chemical Processes**
- **Robust Miniaturised Sensors and In-line Analyser Technology**
- **Sustainable Management of Transports and Utilities Networks**
- **Integrated life-cycle assessment cost-efficient systems for easy-to-maintain networks**
- **Methods/tools for the management of transport & utilities networks in order to improve the serviceability, security and lifetime of the structures**
- **Industrial Scale Implementation of Process Intensification Strategies**
- **Closer Integration of the Forestry Value Chain through Converging Technologies**
- **New Generation of High Brilliance Lasers and Beam Delivery Equipment for Industrial Applications**

- **Functionalisation of textiles & related processes covering wet finishing processes, lamination, coating, plasmas**
- **Technologies for a sustainable, increased self-sufficiency in resources**
- **Advanced personal protective equipment and devices**
- **Micro- and Nano Manufacturing Systems and Platforms and**
  - **Knowledge-based Fabrication - Manufacturing Systems Design, Modelling and Simulation Tools**
  - **Equipment and Tools Integration into Intelligent scalable adaptable manufacturing systems and platforms**
  - **New Flexible, Modular and Networked System Architectures for Knowledge-based Manufacturing**
- **Advances in Human – Robot Interactions in Industrial Applications**
- **Reducing the environmental footprint of minerals and metals processing**
- **Technologies for Healthy, Safe, Accessible and Stimulating Indoor Environments**
- **Retrofit and upgrade of existing underground constructions**
- **Bioproduction of Green Forest Based Chemicals and Materials**
- **Advanced technologies for structural safety and extension of service life**
- **New textile products for innovative technical applications resulting from combination in advancements in fibre and fibre-composite materials and textile formation -yarn and fabric form in combination with polymer coating- and functionalisation technologies.**
- **Scale-Free Manufacturing of Steel and other Metals** *(ESTEP)*
- **New Strategies and Technologies for Mineral Resources Transformation**
- **Substantial innovation in the European medical industry: Development of new types of targeted delivery systems for cancer treatment**
- **Catalysts and processes for the sustainable production of fuels**

- **Advanced materials for fuel cells and hydrogen storage**

Nanomedicine

- **Support to novel industrial development of nanotechnology-based functional in-vivo imaging techniques**
- **Innovation in industrial technologies and systems for in-vitro diagnostics targeting infectious diseases (possibly with ICPC)**
- **Support to industrial competitiveness in delivering therapeutic agents for inflammatory conditions related to diabetes or auto-immune conditions, and nephropathy**
- **Support to industrial competitiveness in cancer treatment**

Nanoelectronics

- **Joint call with IST on nano-electronics and –photonics**

Nano – and converging technologies for energy

- **Development of nanotechnology-based routes for the fixation of CO2**
- **Use of nanoparticles as new solid fuels or additives to existing fuel**
- **Direct production of electricity, alcohols or hydrocarbons**

Nano- and converging technologies for security

- **Nanotechnology-based portable sensing devices for security**
- **New nanotechnology-based protecting and functional textiles**

Nanotechnology for agriculture and fish farming

- **Development of nano-encapsulation technologies for supporting agricultural and fishery industry**

ERANET topics

- **Trans-national cooperation for new innovative products in the forest-based value chains**
- **ERANET in Materials for Energy Applications**
- **ERANET+ in Materials**
- **ERANET+ in "Nanomedicine"**
- **ERANET+ Impact on public health, occupational safety and the environment**
- **ERANET + in Micro and Nano manufacturing (successor of NMT ERA Net)**
- **ERANET + in Manufacturing (successor of MANUNET ERA Net)**
- **ERANET + in Construction**