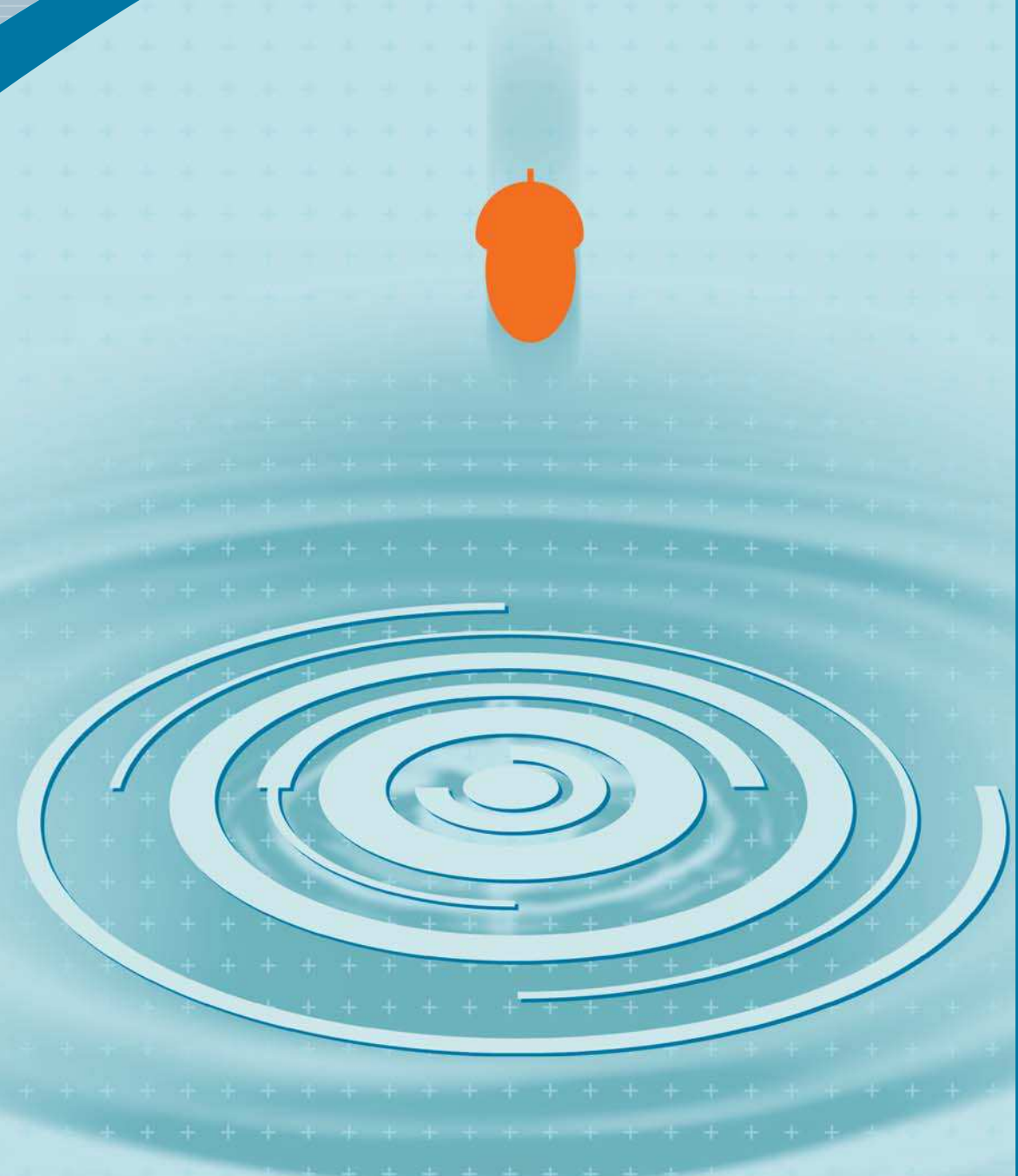
EUROPEAN COMMISSION

Community research

7 March 2006

European Industrial Research



The long-term impact of industrial research

ISSN 1725-8472

INCO invitation to third country researchers

In the spring of 2006, DG Research is launching a call to encourage potential partners in targeted third countries to join running EU-funded RTD projects. Specifically, this dedicated call concerns exclusively projects for which contracts are signed and are either under negotiation or in progress with at least 18 months to run. Potential partners are research entities from targeted third countries which can complement and contribute to the objectives of the project concerned. Funding is available to cover costs linked to the participation of additional partners, including management costs. The call covers all thematic priorities except IST, and has a total budget of up to €20 million. Topics within priority 3, NMP, include long-term interdisciplinary research into understanding phenomena, mastering processes and developing research tools, nano-biotechnologies, and engineering support for materials development, among others. The instruments covered are STREPs, IPs and IPs dedicated to SMEs (IP-SMEs). Specific call information will be available on the INCO Portal on CORDIS at **http://cordis.europa.eu.int/inco/home_en.html**

FP7 and financial perspectives

Less than the Commission proposed, but more than suggested in earlier Council negotiations, the EU research budget contained in the Financial Perspectives for 2007-2013 represents a welcome increase of 75% by 2013. The European Council summit conclusions stated that "particular priority should be given to delivering a substantial and progressive enhancement of the EU's research effort". In addition, the Heads of State and Government invited the Commission and the European Investment Bank to increase their support for R&D through a specific risk-sharing finance facility that will provide loans for a variety of R&D and innovation related activities, including exploitation of research outcomes. This is intended to boost private sector investment in research and help the EU reach the 3% of GDP target for investment in R&D. The conclusions of the European Council and the Financial Perspectives can be found on the website of the British Presidency, at **http://www.eu2005.gov.uk/**

Research priorities of the Austrian Presidency

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The Austrian Presidency, which took over on 1 January, says it will make every effort to ensure the Seventh Framework Programme for Research and Technological Development (FP7) – a central plank of the Lisbon Strategy – starts on schedule. To avoid any interruption between the current framework programme, which ends in 2006, and the new one, all decisions relating to the programme and its implementation must be taken before the end of 2006, says the Presidency's website. On 4-5 May, the Presidency will host a Conference on European Technology Platforms in Vienna that will involve 450 participants in discussions on horizontal issues related to ETPs and their future development.

Additional areas of focus for Vienna will include driving forward implementation of the target of 3% of GDP invested in research, rapid adoption of Commission proposals on an international agreement for the International Thermonuclear Experimental Reactor (ITER), due in the Spring 2006, and discussions on the European Space Programme and GMES. Federal Minister Elisabeth Gehrer will chair the Competitiveness Council when research topics are on the agenda. Vice-Chancellor Hubert Gorbach will take the chair when space issues are discussed. More information can be found on the website of the Austrian Presidency of the European Council at **http://www.eu2006.at/en/index.html**

Quantifying nanotechnology funding

Following two Commission Communications on nanotechnology – a strategy and an action plan – Unit G4 (Nanosciences and Nanotechnologies) of DG Research has published 'Some figures about nanotechnology R&D in Europe and beyond', a compilation of nanotechnology research indicators. The publication compares spending on nanotechnology within Europe and with other countries such as Japan, Australia and the US. Absolute and per capita spending data are presented, as are the public and private components and the growth in funding over time. While Europe is one of the leaders in this field, the report highlights the worryingly low level of private funding and presents possible scenarios for funding under FP7 to maximise efficiency and effectiveness. The report can be downloaded from the CORDIS nanotechnology portal at **http://www.cordis.europa.eu.int/nanotechnology/src/pe_reports_studies.htm**

ETPs – "true champions"

The industrial leaders of the 28 already operational Technology Platforms met in Brussels in December 2005 to discuss the future evolution of ETPs and the potential role of the European Investment Bank (EIB) in supporting them. Fifteen Commission DGs were represented at the seminar and Commissioner Poto nik, in his keynote address, emphasised that openness and transparency are critical to success and that fragmentation of research efforts among ETPs must be avoided. Mr Mertens and Mr Kreilgaard of the EIB spoke on how the EIB can be an active player in ETPs and is increasingly open to higher risk funding for technology projects. Substantial EIB investments in steel projects were presented as a concrete example, and further collaboration is envisaged during the pilot and demonstration phases of the Steel ETP, as well as with other platforms, of course. The seminar noted that most ETPs are moving towards implementation, and their priorities will be integrated into FP7 work where appropriate. Additionally, a working group of ETP, Commission and EIB representatives will produce a 'decision tree' publication to help individual projects to assess their eligibility for EIB funding and suggest additional funding mechanisms aimed at smaller projects.

The *European Industrial Research* magazine provides information and research results in the field of Industrial Technologies – a key element in the EU Sixth Framework Programme (FP6) for research and technological development. Priority 3 focuses on nanotechnologies and nanosciences, knowledge-based multifunctional materials, new production processes and devices. It promotes the transition to a knowledge-based society in Europe.

Visit the Industrial Technologies website at http://europa.eu.int/comm/research/industrial_technologies/index_en.html for more extensive coverage of the issues discussed in this magazine and to discover many more themes and articles on Commission-funded industrial research, updated on a regular basis.

Further information about Priority 3 is also available from the NMP Information Desk: rtd-nmp@cec.eu.int

Published by:
European Commission, Research DG, Directorate G (Industrial Technologies)

Written and produced by:
ESN, Brussels, Belgium

The meeting summary can be downloaded from the new Technology Platforms portal on CORDIS at **http://www.cordis.europa.eu.int/technology-platforms/seminar_en.html**

ACENET – funding sustainable chemistry in the ERA

A major component in building the European Research Area is the ERA-NET initiative to encourage closer co-operation between national research funding organisations. ERA-NET projects aim to align administration, selection and evaluation procedures for funding in thematic areas of scientific research. The Applied Catalysis European Network – ACENET – is one such project, linking research management and funding organisations from nine EU Member States. ACENET deals with catalytic technologies, a vital area of chemistry that operates at the interface between physics, biology, and engineering and material science – truly a cross-cutting discipline. Moreover, its economic importance is huge –over 30% of the planet's GDP depends on catalysis, as do over 80% of chemical industrial processes, worth around €1 500 billion.

After its first year of operation, the ACENET consortium has published its first annual newsletter on progress and new developments. The first major task – to get an overview of priorities and activities in national research programmes in applied catalysis, and to benchmark their research management procedures – has been completed. The newsletter also reports on work to develop a framework for a joint training and education programme in applied catalysis. ACENET's activities so far are characterised by close consultation with other initiatives such as the European Technology Platform for Sustainable Chemistry, EuroHORCs and Susprise – the Sustainable Enterprise ERA-NET. The ACENET newsletter and background summaries can be found on the project website at **http://www.acenet.net**

Gathering inputs on 'nano(eco)toxicology'

Nanocristal of cadmium tellurite

As part of a safe and responsible development strategy for nanotechnologies, the Commission requested, by 28 February, contributions from stakeholders with an interest in nanotoxicology and nano-ecotoxicology, which concern potential toxic effects on living organisms from the substance, production or use of nanotechnologies as well as in the wider environment. Among other topics, contributions may address R&D needs, dedicated databases, and the identification of existing 'poles of excellence'. After analysis of the inputs, the information collected may be discussed in informal workshops or other fora involving selected stakeholders. More information can be found at **http://www.cordis.europa.eu.int/nanotechnology/**

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editorial

European Industrial Research – evolution and impact

FP6 will draw to a close in 2006, although many of its projects will continue for years to come. And in 2007 FP7 will kick off with new sets of themes, and with procedures that build on the old while trying out the new. The size, scope and internal organisation of projects will vary as appropriate for each research topic. It is also foreseen that Technology Platforms and Joint Technology Initiatives will be supported through large-scale projects based on FP6's Integrated Project concept as the flagships for taking European industrial research cooperation to new levels.

This issue of EIR looks back over 15 years of industrial research, from the early Framework Programmes up to today, to examine its evolution – from projects to solve specific industrial research problems into Europe-wide industry-led technology platforms with strategic research plans addressing the EU's policy goals of economic competitiveness and growth. In the Viewpoints section, three experts – 'old hands' in the field of European industrial technologies – share their views on how the Framework Programmes have developed. They speak of industry's positive response to the expanding opportunities offered by international research and the appearance of 'knowledge' as a source of competitive advantage.

The main feature examines the evolution of FP industrial research in two sectors, construction and machine tools. These two 'traditional' industries have different stories to tell of technical and personal development over the years, and of progress from individual results-oriented actions towards Europe-wide collaborative initiatives that network the participants in order to find generic solutions. The feature also describes the Commission's own long-term evaluations of the impacts of industrial technologies research from previous FPs. Only by understanding past successes and failures can better programmes be systematically designed for the future, and the Industrial technologies Directorate has led the way in rigorously evaluating its activities.

Fifteen years ago, research guided by industry-led European Technology Platforms would have been inconceivable. Yet today, ETPs have been established for Nano-electronics, Nanomedicine, Sustainable Chemistry, Steel, Textiles and Clothing, Construction, Industrial Safety, and other fields. As a horizontal platform, linking these thematic, vertical ETPs, Manu*future* will play a vital role in assuring the success of European industrial research. As the platform enters its implementation phase, EIR asks a member of the Manu*future* High Level Group to give his views on the vision and the challenges ahead.

European industrial research from **FP3** to **FP6** – and beyond

EU-funded research in industrial technologies has evolved in successive FPs, and is now almost unrecognisable when compared to the Brite-Euram projects of the early 1990s. EIR asked three experts with long experience of European industrial research to give their personal views of its development.

Nick Hartley, European Commission

In FP3 and FP4, companies were beginning to realise the benefits of collaborating, and funding was available for the sort of technology projects they wanted – they were pre-competitive, and the problems they addressed were common to all. Existing knowledge and knowledge generated by a project was owned by the originating company, but the rest of the team would have royalty-free access.

Nicholas Hartley

Then, in FP5, industrial technologies came under the Growth Programme, which applied the focus rather more to wider societal and industrial problems, creating jobs, growing industry, and new aspects like sustainability and the environment. The consortia were getting larger, and more SMEs were taking part. Many of these have done very well and gone on to successful exploitation of their results, so the FPs definitely helped them.

The new instruments of FP6 – integrated projects (IPs) and networks of excellence (NoEs) – came under some criticism for being dauntingly complex, which to some extent the Commission accepted. Our aim was to make them more autonomous, and this proved difficult, despite long consultation. This is another change – consultation with the Commission is now far more extensive than five or ten years ago.

Under FP7, most industrial research will come under the Cooperation strand, although there will be some linked activities under Ideas ('frontier research'), People (industrial fellowships, extension of the Marie Curie Programme to industrial hosts) and also Capacities (infrastructures). Some of the bold ideas in industry will need access to important facilities like cyclotrons. It will be important, too, to involve third countries in joint research.

Industry is really thinking European, in a very positive way, and the FPs have made a strong contribution to that. Looking into the future of FP7 and beyond needs a bold and multidisciplinary approach. We are still good at the traditional industries, but for Europe to move ahead, we have got to think smart.

Donal Carroll, research policy adviser

Donal Carroll

Enterprise Ireland has evolved alongside the FPs, in turn as a provider of industrial research facilities, a promoter of development and investment, and an international development agency for Irish industry. One of the difficulties we had in FP3 was to persuade industry of the importance and relevance of collaborative research, and this can still be a problem. It involves time, effort and cost, so companies must see it as relevant to their strategic development.

However, by taking part in collaborative research, companies found themselves working with potential customers and this offered valuable business opportunities outside the project. Smaller companies have also benefited since the 1990s by a far greater awareness of their rights to intellectual property protection.

The advent of information and search facilities online made a massive difference. We could focus on face-to-face guidance rather than passing on volumes of information. Also people could access background policy documents, so they were better able to prepare proposals. But many companies felt unable to take part in the new instruments, particularly NoEs, preferring the smaller STREPs. Perhaps it would have been better to have introduced NoEs on a pilot basis.

Since the start of the Third research Framework Programme (FP3) in 1990, European industrial research projects, consortia and instruments have become much larger, more complex and diverse, embracing and enhancing many new technologies. Perhaps the greatest contrasts with the early days are in the progress toward multidisciplinary research, and industry's new enthusiasm for working together at European level.

Taking part in the FPs has helped Irish industry to plan and work on a European and global scale, particularly in the newer technologies. Its companies are likely to become closely involved in the nanotechnology platforms on medicine and IT, while photonics and aeronautics are also strong research areas. The traditional industries need to work through research and innovation towards higher added value, using advanced manufacturing technology to become more competitive with the far east.

The Community has made a clear, consistent effort towards research at the European level, especially with the later programmes, and now with the proposed European Research Council and the linking of national programmes through ERA-Net. A European Research Area in practice, not just in name, is now unstoppable.

Francesco Jovane, industrial research institute


Francesco Jovane

The Institute of Industrial Technologies in Milan (ITIA) has long led Italian industrial research in production processes and related advanced technologies. Personally, I have contributed extensively to the conception and development of industrial strategies, including the FPs and the Manufuture vision for research and innovation in the manufacturing industries. Research is one of the few areas where we really work together in Europe. We do not have a strong foreign policy, but we do have a strong research policy, and this is astonishing.

During the lifetime of the FPs, industrial research projects have become increasingly sophisticated. Thanks to the FPs it has been possible to develop from early technology projects right up to constructing an advanced, innovative industrial pilot plant with European partners. Successive stages of projects in the shoe industry, for example, have moved from machinery development, to national projects on the production process, to the FP5 Euroshoe project on computer-aided, consumer-oriented shoe design and manufacture, and we are taking this further in FP6 with the CEC-made Shoe project which refines the whole product life cycle, from design to recycling. We could only do this with many expert partners from industry, academia and research institutes in different EU countries. The emphasis has moved from basic technology towards knowledge-based systems which take account of the economics and mechanics of the supply network.

The FPs have also encouraged development of trans-sectoral technologies. But their greatest legacy is to contribute strategic thinking for industrial research. Industrialists are now seeing clearly that those who do not move to high added-value products or processes will disappear, and they are working hard to meet that challenge. Companies with similar technology problems have been enabled to work together, sharing research and sharing the outcome. But they cannot just go to the FPs for money – they have to repay public investment by creating wealth and increasing jobs.

> The experts

Nicholas Hartley is Head of the Strategy and Policy Unit, Industrial Technologies Directorate, European Commission DG Research

Until his retirement in March 2005, Donal Carroll was Irish national delegate and contact point for the industrial technologies Programme Committees of FP2 to FP6, working with Enterprise Ireland and its predecessor. He still advises the Irish delegation to FP6.

Professor Ing. Francesco Jovane is director of the Institute of Industrial Technologies and Automation of the Italian National Research Council, CNR. As well as participating as Italian delegate in steering committees defining the work programmes of FP3 to FP6, Prof Jovane contributed to the development of the Manufuture Vision 2020 and Strategic Research Agenda, and contributes to the Manufuture technology platform, of which he is the high-level group vice-president.

Large-scale research brings long-term rewards

The individuals and organisations that participate, the technologies addressed, and the developers, marketers and end-users of these technologies, may all benefit from the cumulative effect of continuous research efforts – and sometimes in ways that were not envisaged at the start. It is only by stepping back that one can begin to appreciate the true impact of the Union's long-term investment in research in terms of scientific and technological progress, industrial competitiveness and the improving health, safety and quality of life for European citizens that it brings.

This article traces the history of EU-funded research in two sectors – construction and machine tools research – from their origins in the early Framework Programmes to the present day and beyond. It illustrates how technical breakthroughs have been achieved by building on previous achievements, and the way in which powerful pan-European research networks have been constructed, paving the way for the Strategic Research Agendas that will drive much of the work of the forthcoming FP7. The feature also looks at the pioneering long-term impact assessments carried out by the Directorate responsible for the European Commission's Industrial Technologies research.

COLLABORATION AND INNOVATION – THE NEW BRICKS AND MORTAR OF THE CONSTRUCTION SECTOR

Construction is Europe's largest source of employment. With an annual turnover of almost €1 000 billion, a total direct workforce of more than 11 million and another 15 million employed indirectly, it contributes about 10% to GDP. The sector is a leading European exporter, reported as winning more than 50% of major international construction contracts and having a volume of business significantly greater than those of Japan and the USA. In terms of innovation, however, it has traditionally lagged behind other industrial sectors. The impetus of European research is bringing change, but conservatism, fragmentation and long product life cycles make this an area in which the exploitation of results is often a protracted process.

"In Europe, the construction sector is made up of around 2.5 million companies, 92% of which employ fewer than ten people," explains Johan Vyncke, head of the Structures, Geotechniques et Execution Techniques department at the Belgian Building Research Institute, and assistant coordinator of E-CORE (see below). "This is not an ideal environment for the rapid take-up of R&D results. It takes time and requires substantial effort for information on new materials, techniques and concepts to permeate through the layers ranging from architects, materials suppliers and contractors to bricklayers and other artisans.

"Moreover, the average life of a building is 50 years, and replacement rates are very low," Vyncke adds, "Given the long timeframes, clients tend to favour the most conservative options, which have long proven service records. In addition, regional traditions in building styles militate against radical change. Under these circumstances, research co-operation accompanied by widespread dissemination of results and best-practice guidelines is essential as the route to innovation. Equally important is the development of appropriate standards – for example, reflecting environmental and health and safety imperatives – to foster the spread of new, improved methods."

Progressive build-up

The construction industry's first real entry into EU-funded collaborative research came in the late-80s with participation in the Brite-Euram programme that was part of FP2 (1987-1991). In 1988, the various national construction research centres joined forces to create the European Network of Building Research Institutes (ENBRI), whose members have remained very active in subsequent Framework Programmes.

By the time of FP4 (1994-1998) they were involved in 101 projects, spanning the SMT, Brite-Euram, JOULE, and ESPRIT programmes. In FP5 (1998-2002), this number had risen to 138 – with ENBRI members leading 31 projects, which all included Industrial partners.

FP5's problem-solving focus steered research into areas such as innovative products and processes for repair and maintenance of structures, sustainable energy, and improved quality control using information and communication technologies. A substantial proportion of construction projects (16 of the138) were networking activities involving the exchange of knowledge and information between large numbers of European organisations associated with specific RTD fields.

Networks widen

"At an early stage, it was generally recognised that stronger links than those between researchers were necessary to bring about change in the conservative and fragmented construction sector," recalls Vyncke. "To meet this need, the European Council for Construction Research, Development and Innovation (Eccredi) was formed late in 1995, bringing together 17 European industrial federations representing all the sector players – materials manufacturers, civil engineering firms, architectural design offices, etc. – and operating as a genuine industrial platform in stimulating joint research."

With Eccredi as a vehicle, and with the support of the Commission, the industry engaged in a number of European collaborations, all aiming to promote synergy between the individual construction RTD projects funded at a European level. Both the secretary general of Eccredi, Carlo De Pauw, and the President Scott Steedman, were heavily committed to making this a successful undertaking.

TRA-EFCT (Targeted Research Action on Environmentally Friendly Construction Technologies – 1997-2001) was the first such initiative, linking the coordinators of some 120 projects in a common action for dissemination and networking. It resulted in the organisation of more than 20 conferences and workshops helping promote coherence in the sector's RTD activities across Europe. A series of 13 final reports reviewed progress and presented project success stories covering materials, quality assurance, environmental technologies, construction management, hazard control, maintenance, repair and recycling.

Towards a Technology Platform

In 2001, TRA-EFCT was followed by the FP5 Thematic Network E-CORE (European Construction Research Network), which went one step further by bringing together the research directors of enterprises and institutions to develop a common RTD strategy. This concluded with a major European Conference 'Building for Europe' (B4E) in Maastricht, the Netherlands, in November 2004. The event also marked the launch of a European Construction Technology Platform (ECTP).

The ECTP is an industry-driven platform endorsed by the commitment of CEOs from large companies. A vision document for 2030 was developed and a Strategic Research Agenda has been drawn up. At the same time, the ECTP was the first to propose the idea of initiating National Technology Platforms to undertake similar actions at Member State level. These have already been set up in 15 of the EU25 countries, and more are in the pipeline. Further ways of collaboration are also being explored, e.g. via the Eureka network and through bilateral or regional co-operations that give the flexibility to deal with local issues.

Need to look further

"The challenge for the future is to engage better with society and to achieve greater SME participation in the different EC RTD actions," Vyncke maintains. "Also, because the potential scope of research is so vast, there is clearly a need for the construction industry to talk more with other industrial sectors such as textiles, automotive, steel and manufacturing.

"Though our industry is slow to bring radical innovation to fruition, its size means that even modest advances can have massive economic and quality-of-life impacts. We can expect to see widespread adoption of emerging nanotechnologies, often developed for other purposes, in applications such as self-cleaning windows and surfaces that minimise energy losses or control moisture transmission. Virtual design and engineering is another area where cross-sectoral knowledge sharing will be of enormous value.

"Our participation in collaborative research has helped to put construction on the map as a forward-looking sector. The challenge now is to integrate further into the developing European Research Area and transform the outcomes of our co-operative efforts into lasting benefits for EU citizens."

> Concrete steps towards a silent revolution

Concrete is the staple material of modern construction. Conventionally, the wet mix must be compacted in order to fill voids, ensure uniform strength and obtain an acceptable surface finish. This is achieved by mechanical vibration, employing equipment that is noisy, heavy, costly and energy-intensive. The process is both environmentally undesirable and hazardous to the health of operators. In fact, many concrete workers stop working before reaching normal retirement age because of health problems. Self-compacting concrete could soon make this a thing of the past.

An FP4 Brite-Euram project launched in 1997 – Self-Compacting Concrete (SCC) – set out to lower the price barrier and to extend the use of SCC to poured-on-site applications. The consortium of nine industrial and research partners from France, Sweden, Belgium, the UK and Spain covered each stage of the production chain, from concrete material suppliers through to end-users, and scored a number of significant successes.

It produced guidelines that characterise the performance and define handling parameters for SCC giving scope for both housing and civil engineering projects. A new admixture was developed and patented, and a completely new stability test procedure devised. Finally, the project developed an expert system, called SCCMix, enabling engineers to specify cost-optimised mixes without resorting to extensive laboratory-based procedures.

The scale of its success earned the project a nomination as finalist in the 2002 Descartes Prize for Scientific Excellence. At the time, its achievements were described as 'the greatest innovation in concrete construction since the introduction of reinforced concrete in the 1850's' and '... the most significant research project ever for the health and safety of European workers.'

Project partners went on to join a number of alliances, both within Europe and beyond, to tackle the outstanding problems. The EC itself funded a further initiative, Testing SCC, within the FP5 GROWTH programme. In October 2004, this completed its brief to deliver test methods for determining the three key properties of fresh mixes – filling ability, passing ability and resistance to segregation. With progressive removal of the various bottlenecks global interest continues to rise. Of the participants from 35 countries attending the SCC 2005 conference in Chicago last autumn, over 70% were drawn from industry.

As one experienced concrete worker involved in the original European demonstrations commented: "What I noticed first was the silence. Usually, pouring concrete makes a lot of noise. Now you hardly need ear protectors. [...] My experiences are exclusively positive. There is less wear on the body and the concrete is much easier to work with. This must be the future."

MACHINE TOOL MAKERS BUILD HUMAN CAPITAL

The European machine tools industry is highly successful, accounting for over 50% of total world production. To sustain this position in the face of growing external competition it must continually provide its customers with new solutions that enhance competitiveness and improve quality by ensuring maximum operational efficiency and equipment productivity.

Figures from the European Committee for the Co-operation of the Machine Tool Industries (Cecimo) indicate that Europe currently dominates the global machine tools market with the 15 Cecimo countries[1] providing some 52% of worldwide sales of €17.5 billion in 2002. Total European employment in the sector was around 158 000 in 2002, spread over some 1474 companies. It thus makes a key contribution to the European economy, both as an industry in its own right and by its contribution to the manufacturing community as a whole.

However, low labour costs in other parts of the world are attracting production away from Europe, making it essential for EU manufacturers to compete by investing in the very latest automated equipment to increase productivity. Machine tool manufacturers must strengthen their knowledge base in order to deliver such tools, not only to meet the challenge from abroad, but also to grasp the opportunities on offer from the rapidly developing manufacturing industries in China and elsewhere.

Specific sectoral needs

As part of the 1994-1998 Brite-Euram III programme, Camatt (Concerted action on research related to machine tool and manufacturing technology) established an open network of European research institutes and industrial organisations.

Next, in FP5, came Mantys (European Thematic Network for Manufacturing Technologies), which promoted innovation in manufacturing technologies and provided a platform for researchers and industry to exchange views and results relating technology to factors such as employment and education, business cycles and sustainable growth.

"While SMEs predominate in our sector, they differ from those in the construction industry by typically employing 15-20% of personnel in their own RTD activities," points out Cecimo Secretary General René Groothedde. "Consequently, maintaining the availability of high quality in-house staff is crucial and contracting out research is less appropriate.

"The smaller projects of earlier Framework Programmes were generally in tune with our needs, but the trend towards higher-level integration has demanded some creative rethinking," Groothedde continues. "Cecimo has piloted new modes of collaboration that embraced both technological and socio-economic issues. With shortening technology life cycles, we saw that some results could be more rapidly achieved through national initiatives on a more modest scale. At the same time, we looked at ways in which SMEs could be brought into larger on-going EU-level initiatives at stages where their participation could provide mutual added value. We also sought to ensure that they could count on retaining adequate legal rights to reward their contribution."

> EU-level involvement boosts career and company prospects

EU-supported research has played a major role in shaping the career of Rikardo Bueno, the coordinator of NEXT – who is now responsible for scientific policy at the Spanish technical centre Fatronik. After graduating as an industrial engineer, he joined the fledgling SME in 1989 to work on the Brite-Euram I project Idefix (Tools and methods for ideal fixturing of mechanical work pieces with modular systems). With funding from a group of Spanish machine tool makers, Fatronik went on to participate in more regional, national and European initiatives. For Bueno himself, coordination of the EU project XPERTS provided the opportunity to complete his PhD thesis on knowledge-based machine-tool design.

With growing experience, the company was able to coordinate its own projects in FP4. "This enabled us to broaden our horizons, from purely manufacturing-related technology, into socially important areas such as alternative energy generation and aids for the elderly and disabled," Bueno notes.

"In FP6, we are not only leading NEXT, but also fronting two technology-focused STREPS. As a result of these activities, the Spanish government has appointed us to head the national Manufuture Technology Platform – and I am personally involved in both the High Level Group and the Support Group of the ETP. Thanks to our long-term involvement, we are now in a position to raise awareness of the manufacturing cause at a political level, and to promote the interests of European industry in general."

Looking beyond technology

Mantys involved more than 20 European laboratories and research institutes, a socio-economic task force of experts from universities, companies and machine tool builders' associations, and an Industrial Advisory Committee representing the automotive, aerospace, mechanical and machine building sectors. As well as producing a vision and roadmap for the sector, Mantys proved a very efficient communication forum in the run-up to FP6, allowing researchers and EC officials to discuss RTD priorities and the new instruments.

This work is taken forward in the current Integrated Project NEXT (Next generation production systems), launched in September 2005. As well as pursuing technological objectives related to the development of environment-friendly machines and processes, improved human-machine interfacing and the integration of systems into high-productivity factories of the future, it specifically addresses new business models and new approaches to training, marketing and information dissemination.

"By targeting the commercialisation of results by the industrial companies involved, generating start-up companies and defining new ways of doing business (e.g. selling production hours instead of machines), we can maintain Europe's leadership in this sector," affirms Groothedde.

"NEXT will be taking steps to make the industry more appealing and thus attract the human resources we need for sustained growth. These will include the development of new content for training courses and skills provision – including a pilot 'teaching factory', analogous to today's teaching hospitals. Marketing strategies will be designed to persuade people that the production world offers worthwhile careers in a promising and stimulating professional environment. Because the activities in our sector are so inextricably bound up with those of its diverse end-user community, there is no intention to create a separate European Technology Platform for machine tools," Groothedde adds. "Instead, we are concentrating on contributing to the more broadly based Manufuture platform and Strategic Research Agenda.

"Meanwhile, the core partners from Mantys are continuing to work together in consolidating its findings. A successor, Mantys+, has been proposed as a means of initiating shorter-term technology transfer and furthering our exploration of business modelling and educational innovation. This is now on the reserve list for EU funding."

(1) Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Italy, Netherlands, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom

WHAT MEASURE OF SUCCESS?

In the field of industrial technologies, the EC's Research DG regularly evaluates the return from EU investment in the Framework Programmes by conducting follow-up reviews of the successes and shortcomings of its collaborative projects. Immediate post-project evaluations and longer-term impact assessments of 2 000 FP3/4 initiatives completed between 1996 and 2001 were undertaken in two studies reaching their conclusion in 2004. A further exercise now underway is assessing the results and anticipated socio-economic impact of 1 050 projects in the FP5 GROWTH programme.

Between early 2001 and 2004, and international consortium of consultants carried out the 'EVIMP' study which included:

- initial evaluations of around 1 200 projects completed in the period 1999 to 2001; and,
- impact assessments on approximately 800 projects completed in the period 1996 to 1998, which had previously been evaluated three to four years earlier.

The studies, based on assessments of each project by independent experts, followed by a combination of statistical and qualitative analysis, considered three types of project:

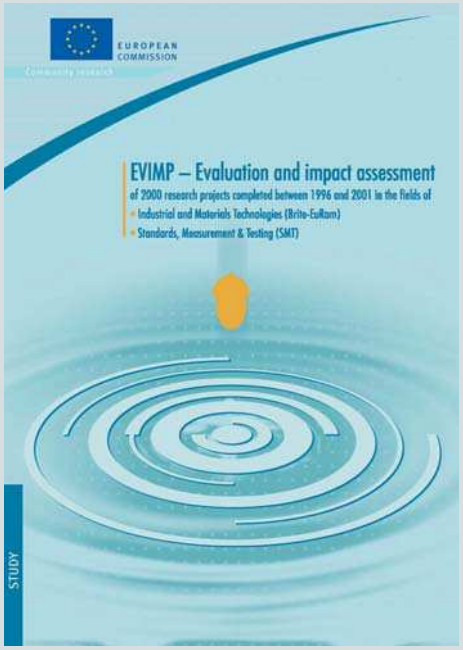
- ***RTD projects*** – collaborative research projects typically involving large multinationals, small firms and leading-edge research institutions as partners;
- ***co-operative research (CRAFT) projects*** – in which research institutions are contracted to perform R&D on behalf SMEs; and
- ***co-ordination activities*** – Thematic Networks and Concerted Actions

The scope of the objectives pursued by these projects was vast, as is the range of the resulting outputs and outcomes. These typically comprise a mixture of knowledge, networking and strategic benefits, together with tangible outputs in the form of products and services and, in some cases, economic gains. There can be little doubt from the evidence amassed that, in aggregate terms, the projects can be counted as successful.

Project outputs, outcomes and impacts measured in the two studies were all characteristic of well functioning collaborative research and development programmes, and were fully in line with programme aims and expectations. Critically, goals were achieved or exceeded in most projects, and subsequent impacts on research teams, partner organisations and the environments in which they operate were assessed as important. Attainments in key areas such as competence building and networking – the primary aims of collaborative research – were particularly marked. Downstream achievements in terms of new products, processes and economic benefits are also readily apparent.

Life cycle link

As was to be expected, the EVIMP study demonstrated the relative dominance of early-stage outputs such as publications, new tools and techniques, and demonstrators and prototypes, both at project end and after three years. It is typical of programmes that focus on capability building and pre-competitive work that figures were lower for outputs such as new products, processes and services that come later in the research life-cycle.



The same pattern is reflected in lower figures for economic outcomes per project. The fact remains that aggregate economic outcomes were substantial, especially since the assessments made were minimum estimates. The 1 861 projects included in a full statistical analysis (corresponding to a total expenditure of €3.36 billion, of which EU funding accounted for €1.86 billion), generated increases in turnover after three years of around €3.7 billion, with increases in profit and cost savings around €1.5 billion. Similarly, partner organisations created about 8 700 new jobs as a result of participation in the projects, and safeguarded another 6 800.

New study

A second study, EVIMP2, is now pursuing a similar evaluation of 1 050 RTD and CRAFT projects, Thematic Networks and Concerted Actions from the FP5 GROWTH programme. In the first year of this study, only 216 projects have been assessed, but some preliminary conclusions have already emerged.

Project profiles have been identified in terms of size and structure of partnership, industry sector in which research has been conducted, funding, duration, risk profile at start-up, impact of funding, strategic objectives for the partners, and project objectives.

Of the initial batch, 80% of the projects for which a programme objective was considered as relevant have met or partly met this objective. It can therefore be concluded that the projects have successfully contributed to achieving the objectives of the GROWTH Programme.

Two thirds of the projects are likely to meet or exceed partners' expectations. For about half of the sample, partners considered the outcomes to be worth the cost of participation or even substantially more – despite the pre-competitive nature of the research. Most are expected to meet or exceed expectations in terms of impact on industry. But the impacts on environment and society of individual projects of this size are difficult to detect.

Overall project performance has also been assessed. Each project was reviewed and classified in one of the following categories: success (26%), potential success (20%), low demand project (31%), and failure (22%).

The share of successes and potential successes is the same for RTD and CRAFT projects (46%); however, the proportion of failure is much lower for RTD projects (18%) than for CRAFT projects (33%).

Significant conclusions

While the conclusions of the two reports paint a generally positive picture, they have also highlighted a number of areas for improvement in the programmes. The first findings of the EVIMP study contributed to the transition from the 'technology push' of FP4, through the problem-solving rationale of FP5, to an FP6 in which exploitation potential is rated as highly as scientific/technological achievement. They also demonstrated the need for the Exploitation Strategy Seminars described in the following article. An early recommendation arising from EVIMP2 is that the proposal vetting panels should be broadened to balance scientific expertise with that needed to assess projects as investments in business and policy objectives.

Despite any possible shortcomings, the EVIMP final report insists: 'One point that cannot be overstated is the criticality of EU funding for those involved and for the resulting impacts. This statement is repeated, without exception, throughout every sector and sub-area analysed in this report, where it is clear that the vast majority of projects would not have been undertaken without EU support. Commission funding allows partners either to undertake strategically important work they could not otherwise have contemplated, or permits them to undertake the work in a quicker and more advantageous fashion.'

Similarly, a key finding of EVIMP2 is that ' … for both RTD and CRAFT projects, 61% of the projects would not have been realised if they had not been funded by the EC.'

Furthermore, the latter report notes: 'Many R&D projects are to be considered as one step in a sequence of projects that would eventually lead the development and/or commercialisation of spin-off technologies or spill-overs into other areas. The existence of such opportunities has to be evaluated to provide a fair picture of the success of these projects.'

Taking industrial research projects to market

Long-term impact assessments of completed industrial technologies projects in successive Framework Programmes have identified a number of common barriers to the commercial exploitation of research results. Now, Exploitation Strategy Seminars are helping the partners in current projects to anticipate and avoid these problems – increasing the proportion that will be able to bring the outcomes of their research to market.

A frequent criticism of the EU's Research Framework Programmes has been their relative weakness in commercialising their world-class scientific and technological outcomes. Uniquely, the industrial research programmes – Brite-Euram and SMT in FP3 and FP4, Growth in FP5, and NMP in FP6 – have undertaken detailed follow-up studies to establish projects' long-term impacts on competitiveness and employment. These have helped to reveal the factors that help to assure successful commercialisation, and those that most often prevent or hinder it.

The Commission has used this intelligence to refine its project selection and management procedures. Since April 2001, it has also organised seminars to address barriers to exploitation directly at the level of individual projects. Widely welcomed by the research partnerships, they have also been shown by the most recent evaluations to have measurable benefits in terms of economic impacts.

Strategy for exploitation

Following the successful experience of a pilot series of 75 'TIP (Technological Implementation Plan) seminars', the current Exploitation Strategy Seminar programme started in April 2005. It will offer 45 seminars over two years, with a further 45 planned for the two following years.

Each seminar is arranged for a single project. Coordinator Mauro Caocci explains that it takes place as early as possible in the project – usually after about a year. (The average project length is just over three years.) "The first objective is to help participants develop a plan for using and disseminating knowledge gained by their research, which is required under FP6," he says. "The second is broader. We give them a method to deal with issues like intellectual property rights, risk assessment and evaluation of market potential. Normally, when the partners meet, they mainly focus on technical matters. This seminar is a chance to discuss non-technical aspects of how to exploit their findings."

Before each seminar, the animator examines the technical aspects of the project, as well as current research and knowledge of the subject, existing related patents, the potential market for the project results and competitors.

Dr Caocci stresses that the main aim is for all participants to understand what is the real, exploitable outcome of the project. "Then we can begin to understand how and when it will become available, what intellectual property protection is needed, who is responsible for that, who will own those rights and who has the rights to exploitation," he says. The analysis can be very complicated, especially for the larger Integrated Projects which may have up to 50 partners. The seminars also analyse the risks that may threaten the project – for example, disagreements among partners on specific issues. An action plan compiles these problems, their solutions, each partner's responsibility and the likely costs.

The participant's view

Partners in the FP5 project Specsep, which is developing membrane systems to ensure the quality of anaesthetic gases, took part in a TIP seminar halfway through the project. "It was very beneficial, and if it had come earlier in the project, it would have helped even more," comments Michael Riecke of German partner Draeger. "It brought people together and forced them to discuss the critical points, which is not always easy. Everyone saw how their work package related to the project as a whole, and how to fit them together without any gaps. It was also a great help in improving communication between the partners, in clarifying who had the right and the responsibility to do what, and how the project related to the rest of the world."

(1) See feature article, page 12.

Rolls-Royce production facility, Inchinnan, Scotland

Manufuture gains momentum

The Manufuture initiative is a European Technology Platform, designed to underpin a competitive, sustainable and job-creating EU manufacturing sector in the years ahead. Recognising the formidable challenges, the initiative advocates radical new approaches to product concepts, production technologies, political support and personal preparation for a globalised, knowledge-based economy. Carlos Costa, Vice-President of the Manufuture High Level Group, Board Member and Executive Director of Caixa Geral de Depósitos, Portugal's largest bank, and a former EC Head of Cabinet, outlines the Manufuture vision and its progress towards realisation.

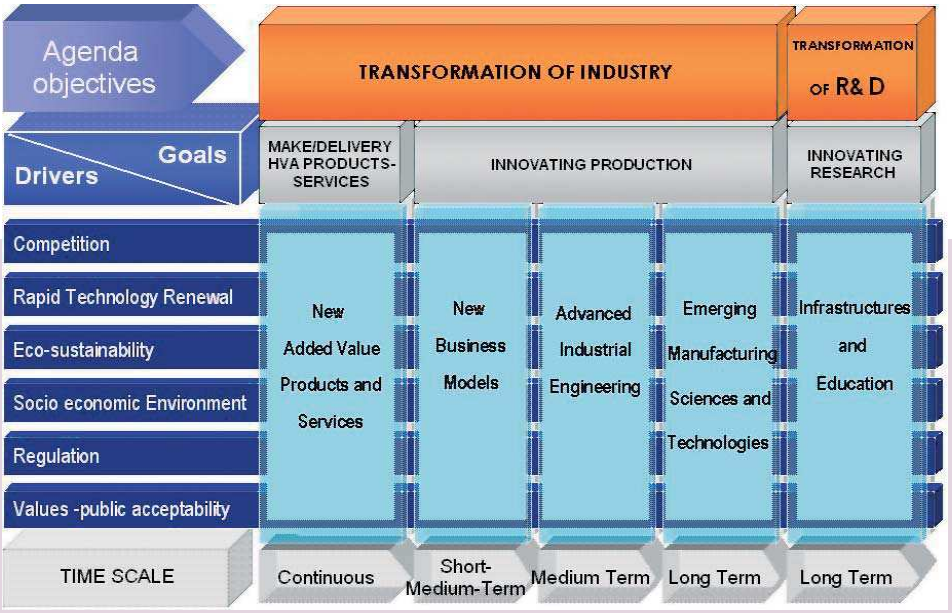
EIR: *Why do you believe Manufuture is so important for Europe?*

CC: Manufacturing in Europe provides jobs for around 27 million people and produces an added value exceeding €1 300 billion from 230 000 enterprises with 20 and more employees. Its economic impact is therefore very considerable. But, although the sector offers huge potential for generating wealth, jobs and a better quality of life, it faces intense and growing competitive pressures on two fronts. In the high-tech sector especially, the world's developed economies pose the greatest threat. On the other hand, manufacturing in more traditional fields is increasingly migrating to low-wage countries such as China and India. And these, too, are rapidly modernising their production methods and enhancing their technological capabilities.

It is vital to combat these pressures. To do so, we need to transform industry's mindset from conventional ideas of competitiveness based primarily on cost to a new vision of success built around research-based knowledge creation and added value.

And there is no time to lose. Although it is true that tomorrow's world may be dominated by new industries and technologies, these will not grow in a vacuum. Retaining

Carlos Costa



a strong manufacturing capability in Europe is the driver for research and innovation. Without it, the entrepreneurial spirit will wither. So we must balance incremental advances for short-term improvement in established industries with radical change to achieve revolutionary breakthroughs in emerging areas such as nano- and bio-technologies. Moreover, to gain maximum return on any investments, research efforts must be focused on well-defined strategic goals and market needs.

This can only happen if we involve as many stakeholders as possible – the policy-makers at European, national and regional levels, the large and small industrial actors, the academic and educational establishments, the finance providers, and the general public, both as customers and as potential production workers of the future.

EIR: *How will Manufuture achieve these objectives?*

CC: A number of 'vertical' action plans and Technology Platforms (TPs) have already been set up, or are in the course of preparation, to tackle manufacturing issues in various technology- or sector-specific contexts. Manufuture goes a step further by addressing underlying 'horizontal' approaches, applicable across a broad spectrum of industries.

The High Level Group (HLG), created in the summer of 2003, defined the fundamental requirements, which it presented in December 2004 as the document 'Manufuture – a vision for 2020'. With the help of a specially convened Support Group, these ideas have now been further developed in the Strategic Research Agenda (SRA), which was launched at the recent Manufuture 2005 conference in Derby, UK.

Meanwhile, the EC and the HLG have been strongly committed to promoting these concepts throughout Europe. Active dissemination of the messages to political and industrial leaders has already led to the formation of national initiatives in over half of the Member States. In my native Portugal, for instance, we have a group comprising more than 60 experts, which for the first time is able to present the government with a consensus view of manufacturing industry as a whole – including contributions from the crucially important SME community. A Manufuture Industrial Advisory Group will meet, co-chaired by a prominent businessman, Belmiro de Azevedo, bringing together relevant industrialists from Member States to reflect upon documents produced by the High Level Group and the Support Group, especially Vision 2020 and the SRA, in order to reach a common vision shared by all stakeholders concerned with the Manufuture goals.

HLG members have participated in early meetings of the sectoral TPs, and again have been able to underline the synergy arising from a shared approach.

With all of these positive activities now underway, I believe Manufuture will become one of the most significant mechanisms underpinning the fulfilment of the Lisbon Council's ambition to make Europe the world's most successful knowledge-based economy.

EIR: What will be the next steps?

CC: After the Derby conference in December 2005, a summary of the SRA was published on the Manufuture website and opened for stakeholder consultation and comment until mid-February.

A summary of the revised recommendations is due to be published in March. Within 4-5 months of this date, the Support Group will aim to issue a first draft of its detailed proposals for implementation. A further conference in October 2006 will provide a forum for discussion and formal approval of proposals suitable for incorporation into the EU's Seventh RTD Framework Programme and parallel national and regional funding schemes.

> Manu*future* conference 2005

David Williams of Loughborough University

At the Manufuture 2005 conference hosted by Rolls Royce in Derby, UK, on 6-7 December, more than 300 representatives of industry, academia and government met to review the progress of the initiative and discuss proposals presented in the newly-published Strategic Research Agenda.

EC Research Commissioner Janez Potočnik emphasised the importance of manufacturing activities to Europe, as the source of 75% of EU GDP and 70% of direct and indirect employment. Manufuture and the other European Technology Platforms now underway are excellent tools to help overcome the barriers of a multinational Community, he said. They will make it possible to build a European Research Area that will enable all Member States to work together in pursuit of continuing competitiveness and the maintenance of social standards.

Members of the HLG outlined the recommendations contained in the SRA, focusing particularly on the core reference model, which proposes the development of an implementation plan linking six drivers of industrial transformation to five pillars of action.

The meeting concluded with a series of sector-specific workshops, during which delegates were able to offer their views on how this process should proceed, and to reach an initial consensus on research priorities meeting common needs.

Building critical mass

FP6's NMP programme encompasses research on nanotechnologies, advanced materials and production processes. Following 15 calls for proposals over the past four years, the programme has awarded contracts worth around €1.5 billion to nearly 400 international projects, many of them of an unprecedentedly large scale. This impressive body of work – and the networks of scientific and industrial partners that are carrying it out – form central components of Europe's knowledge-based response to the threatened erosion of its competitiveness.

Many NMP projects will run until 2010 or even later, and in the case of those selected from the most recent calls for proposals will not even begin their work until the second half of 2006. Nevertheless, with the last NMP calls closed on 15 September 2005, it is at least possible to present an initial overview of the scale of the programme's work and the breadth of its participation. (It should be noted that since contracts have not yet been finalised for the most recently selected projects, the figures below may be subject to minor adjustment.)

Research and Industry working together

In total, 2 816 eligible proposals were submitted in response to the programme's calls, involving more than 38 920 participations (individual partners may have participated in more than one consortium). In fact, this figure may significantly understate the number of actors involved, since data is not available for the numbers of partners involved in many Stage 1 proposals that did not advance to Stage 2.

Among those involved in the proposals, 31% were from industry, of which more than half were industrial SMEs; 34% were universities and 25%, research organisations.

Of the 2 816 proposals, 386 (13.7%) have been selected for funding – 286 of which had signed contracts by January 2006. These projects involve 5 255 partners, 36% of which are from industry; 31% are universities and 27% are research organisations.

The 386 selected projects share €1 467 million of community funding (including contributions from third countries), around 56% of which goes to 92 Integrated Projects – an average of €8.7 million per project. The shares of the total allocation are shown in Figure 1.

From 51 countries

Geographically, participation in the FP6 programme is more widespread than ever, with participations in the proposals submitted from organisations in no fewer than 75 countries. Partners in selected projects come from 51 countries, including India, Japan, Colombia, Mexico and Belarus. Inevitably, there is considerable concentration in the larger EU Member States, with Germany, Italy, the United Kingdom, France and Spain in the top five positions for numbers of coordinators and numbers of partners, among both proposals and funded projects. Figure 2 shows the 12 top-ranked countries by numbers of coordinators.

Figure 1: Distribution of funding by instrument

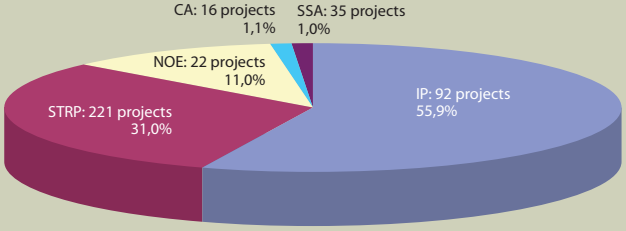
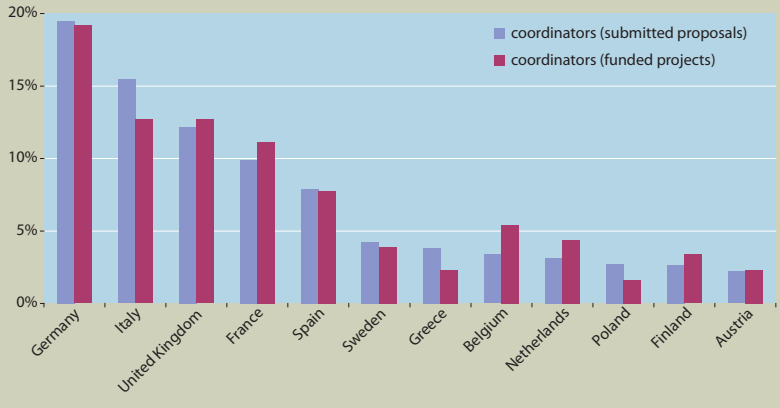


Figure 2: Highest participating countries, by coordinators' country - proposals and funded projects (per cent of totals)



Industrial round-up

This section of European Industrial Research presents a cross-section of successful Commission-funded industrial research projects. In this edition, the case studies are drawn from recent evaluation and long-term impact studies (see pages 12-13).

More information about these and many other projects can be found on the Industrial Technologies website at:

http://www.europa.eu.int/comm/research/industrial_technologies/impacts/list_impacts_en.html

Cleaner, cheaper nanoparticles

Carbon black and carbon nanoparticles have significant technological and economic potential across a range of applications. However, the combustion techniques used to produce them are low yield and energy intensive processes. The **PLASMACARB** project has developed a new plasma-based production process for nanoparticles that can appreciably reduce the cost of these materials, thus accelerating their take-up in user industries. The process allows also the use of lower cost raw materials for the production of carbon black as well as renewable carbon precursors in place of petrochemical oils.

More information:
http://ica.cordis.lu/search/index.cfm?fuseaction=proj.simpledocument&PJ_RCN=4674976&CFID=6413548&CFTOKEN=30669972

Carbon nanoparticles, including nanotubes and fullerenes are an emerging market with promising applications such as carriers for drug delivery in medicine, precursor molecules for new drugs and organic photovoltaic materials. However, the current price for mixed fullerenes is high, above 10 €/g, a level that could discourage industrialisation and take-up. This high price is due to the combustion process used to manufacture carbon nanoparticles. By developing a continuous gas-phase plasma-based production process for carbon nanoparticles the Plasmacarb consortium has demonstrated that significant cost reductions are possible. An experimental 250kW plasma reactor was used during the project and is still operated by partners Timcal and Ecole des Mines. Led by the Belgian company Erachem and Ecole des Mines, the nine-member Plasmacarb consortium included research and industrial partners with interests in carbon nanoparticles. The Swiss company Timcal Ltd, a leading supplier of carbon-related products, took over Erachem's carbon division in 2003. Timcal is now planning the industrialisation of the Plasmacarb process.

Carbon black

Collecting sunlight with **conductive glass**

Extensive research efforts are directed to developing renewable energy technologies that are vital for environmental protection and energy security in Europe. The **SPARKGLASS** project developed an innovative manufacturing process for electrically conductive glass for use in solar energy systems that have moved very rapidly into industrial production.

More information:
http://www.ibe-tpvs.com

Led by Ingenieria e Industrias Bioenergeticas S.L. (IEIBE) from Spain, the cross-disciplinary Sparkglass consortium united partners from Spain, Italy and Germany in developing an efficient production process for electrically conductive transparent glass to replace silicon-based solar cells. This glass has many applications, but particularly in photovoltaic technologies that are so important for EU energy policies. By incorporating such glass panes into buildings to provide electricity and heating, costs can be reduced and the environmental impacts of fossil fuels are lessened. In addition, the transparent glass can be mounted vertically and thus replace conventional windows.

The patented Sparkglass process was so promising that it was rapidly scaled up into industrial production where it offers a 15% increase in solar energy collection efficiency and a 60% reduction in the manufacturing cost. This is already having an impact in the growing market for solar energy panels and there is much international interest, even from as far away as China. Two of the Spanish partners have opened new business lines for solar panels and components. And the research is continuing today, IEIBE is already working on new applications, in particular uniting the conductive glass with bricks and ceramic roof tiles to allow solar energy collection from the whole surface area of a building.

Reinforcing resins with **nanoadditives**

While additives to polymer resins can offer improved properties, they can also cause processing problems that result in inferior products. The **NANOADD** project developed 'nanoclay' additives for resins that bypass these problems and result in stronger, tougher and more chemically resistant resin-based products such as blow moulded containers and drums.

More information: http://ica.cordis.lu/search/index.cfm?fuseaction=proj.simpledocument&PJ_RCN=5118195&CFID=6414359&CFTOKEN=96980447

Polymer resins, better known as 'plastics', are used in a huge variety of products – toys, car parts, containers and furniture to name but a few. This is because of their flexibility for manufacture and their properties such as strength and toughness. However, ever-higher demands are made on polymer resin properties for both industrial and consumer applications. Adding a micron-sized filler material to the resin is one way of improving its physical properties, but this can cause the viscosity of the resin to rise, which leads in turn to processing problems and reduced strength and toughness.

To overcome this problem the Nanoadd project developed nanofillers for resins that both avoid processing problems and improve product performance. The main issue in the project was to find a suitable nanofiller material, a nanoclay, with optimal properties for processing. Led by GEM Plastics Ltd from Ireland, the six-member Nanoadd consortium developed a nanoclay that gives enhanced performance in the final nanocomposite product, including improved strength to weight ratio and flame resistance. The industrial partners have used these nanocomposites in a range of new products, for example, new high-density polyethylene blow-moulded containers with high chemical resistance, impact strength and stackability to serve the agrochemical, pharmaceutical and food industries.

Less washing for **cleaner glass bottles**

Glass bottles and jars are used widely in the processed food and beverages sector to carry their products to the consumer. The **PROGLASS** CRAFT project developed a glass container protection system that does away with the need to wash and dry the containers before filling them. This improves food quality for the consumer and reduces manufacturing costs for the producer.

More information:
http://ica.cordis.lu/search/index.cfm?fuseaction=proj.simpledocument&PJ_RCN=5167360&CFID=6414359&CFTOKEN=96980447

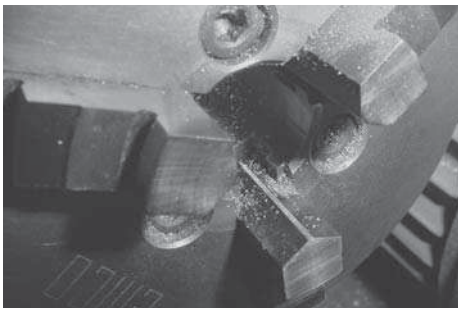
Fine wines, spirits, olive oil, jams and marmalades are some of the many premium products that are stored and sold in glass containers. Before filling, these containers are washed and dried to remove any external contamination that has built up since the container was manufactured. These washing and drying processes are an expensive step in the manufacturing process. To eliminate this expense, the Proglass consortium developed an automated process to apply a plastic film to the container openings as an integral step in glass container manufacture. This film protects the container from contamination until just before it is filled, when the film is removed automatically.

Led by Stara Glass SpA of Italy, the 12-member consortium included equipment, container and food manufacturers as well as research organisations. They estimate that the three food processing partners could save €200 000 p.a. by using this technology to eliminate their washing and drying steps. In addition, although the plastic film adds to waste, this is outweighed by the environmental advantages from reduced water and energy use. Sealing equipment based on the Proglass results has already been sold to wineries in Chile as well as to customers in Italy and the US.

Nanocomposite coatings for **those 'difficult' materials**

The majority of machining tools for cutting, drilling, turning, milling and stamping are often coated to improve tool life and the quality of the machined part. But these conventional wear coatings can reach their limits when cutting difficult materials. The **NACODRY** project produced and tested superhard nanocomposite wear coatings for machine tools that allow difficult materials to be machined and reduce the need for polluting lubricants used for cooling.

More information: http://ica.cordis.lu/search/index.cfm?fuseaction=proj.simpledocument&PJ_RCN=4639199&CFID=6414359&CFTOKEN=96980447



Machining technology requires ever-higher cutting speeds, better surface finishes and lower consumption of coolants and lubricants that make up a large part of machining costs. This is tricky when cutting difficult materials. Less coolant means higher cutting temperatures that reduce tool life, so to cut at higher temperatures demands advanced tool coatings with improved toughness, adhesion, stability and oxidation resistance. The Nacodry project developed such improved coatings through exploiting phase segregation in Ti-, Al-, and Si-nitride alloys to produce nanoscale structures in the thin film coatings that greatly improve tool performance.

Led by Trattamenti Termici Ferioli e Gianotti SpA of Italy, the Nacodry consortium successfully developed a new and innovative wear-coating deposition system for the nanocomposites. Tests on cutting and stamping tools showed increased tool life and excellent performance and finish on difficult-to-cut materials. Critically for cost and environmental performance, the coatings need considerably less lubrication and in some cases none at all. Nacodry partners have gone on to commercialise the results, providing both coating services and deposition equipment to end-users. Nacodry nanocomposite coatings are now used extensively in manufacturing, for example by Airbus for cutting nickel alloys and other materials for the new A380 aircraft.

Brighter and **better lighting**

Demand is growing for outdoor lighting that uses ultra-high brightness light emitting diodes (UHB-LEDs). They are employed in traffic signals, car lights and outdoor displays of moving colour pictures. The **RAINBOW** project united seven partners ranging from large and small companies to a university in a quest to develop mass production methods for these diodes.

More information:
http://europa.eu.int/comm/research/industrial_technologies/impacts/article_3022_en.html

Using light emitting diodes for lighting is popular because of their brightness, long life and, importantly, their high efficiency that can save much energy. The partners started by elaborating the critical stages in producing opto-electronic prototype devices of LEDs (emitting in the wavelength range 400nm to 500nm); and laser diodes (operating at a wavelength of around 400nm). By defining all of the technological process steps from material studies through to device chip bonding the partners showed that mass production of these devices was feasible. They then used this information to successfully fabricate blue, blue/green and yellow LEDs and blue laser prototypes.

Led by Thomson-CSF of France (now Thales), the consortium included reactor manufacturer Aixtron from Germany, and materials company Epichem from the UK, who made critical contributions to developing the source materials and deposition processes for the InGaAlN alloys on which the devices are based. Both companies have gone on to successfully commercialise these results, indeed Aixtron went on to double its turnover within one year of the end of the project. The device processing technologies developed during the project, such as ohmic contacts and dry etching, now allow multicoloured LEDs to be manufactured on an industrial scale and Thales intends to use the outputs of the Rainbow project in a number of applications.

Bringing standards up **to scratch**

Production of advanced components for automobiles, spacecraft, communications systems and many other industries depends on the use of thin, hard coatings. The **FASTE** project worked to meet the demand for proven effective hard coatings, which is growing dramatically as they enable production of lighter, tougher and longer-lasting products.

More information:
http://europa.eu.int/comm/research/industrial_technologies/articles/article_1721_en.html

Before industry can make use of the continuous improvements in coating materials, standardised test methods are needed to demonstrate that they will be able to offer the qualities needed for particular purposes. The 15 members of the FASTE project combined five separate project proposals, each originally intending to contribute a specific type of standard test method for coatings, with the aim of fabricating reference samples of coatings under controlled conditions. The partners then tested a number of different measurement techniques in a total of 34 laboratories, such as acoustic methods for determining coating thickness, scratch testing to determine mechanical strength and adhesion to the substrate, nano-indentation to measure hardness and elastic modulus, and tribological tests for wear resistance. FASTE has had spectacular success. Three partners participating in the project have gone on to develop scratch test instrument calibration services and two are marketing advanced scratch test instruments and are developing lower priced models for

industrial users. Two of the tribology procedures have been accepted as the basis for new European standards, which will eventually lead to exploitation by makers of wear testing instruments. Perhaps the most far-reaching effect of FASTE is that it stimulated the exchange of ideas and experience in the area of friction and wear of interacting surfaces, which resulted in the establishment of the European Virtual Tribology Institute – VTI, under FP4.

PVC Recycling, a profitable opportunity **for the industry**

Recycling is becoming the norm all over Europe, and many of us carefully recycle household rubbish. However, there are other everyday materials that could also be recycled profitably, including high-quality PVC from electric cables. The **TRICARE** project successfully developed a pre-treatment system and tribo-electric separation process to separate cable PVC from other materials.

More information:
http://europa.eu.int/comm/research/industrial_technologies/impacts/article_3026_en.html

Every year, around 900 000 tonnes of used electric cables are treated for metal recovery, but about 400 000 tons of this is actually PVC plastic that is being put into landfill as waste. One of the difficulties of recycling PVC is that the plastic scrap includes rubber, and as PVC and rubber have the same density range it is difficult to separate the two. The Tricare project aimed to pre-treat the PVC scrap and then to use a little-known technique called 'tribo-electric charging'. The partners developed this technique to separate PVC and rubber from cable scrap leaving 99.5% PVC. They then used melt filtration to remove the last percentage of metal and rubber. The five partners also believed that the tribo-electric equipment could be used to recycle other PVC-containing products such as medical waste, window frames and car dashboards and taillights. This hope has proved correct.

Led by KEMA Nederland BV of the Netherlands, the Tricare recycling project proved an immediate success. A joint venture between Solvay, Tecnometal and other companies has established a recycling plant in Italy. Solvay is designing similar plants for Spain and Germany and hopes to set up several more by 2010; recycling 50 000 tonnes of cable waste and producing 30 000 tonnes of recycled PVC and €2 million in profits per year, as well as creating 120 new jobs.

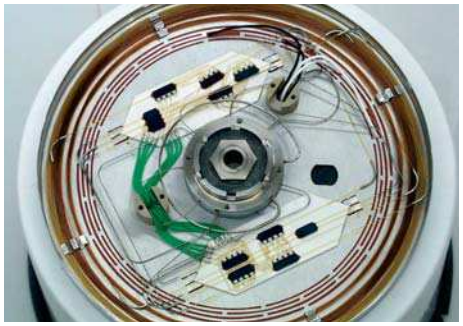
New technologies for **micro fluid devices**

An ink-jet printer delivers ink through a tiny jet from a cartridge – the most recognisable example of the growing number of micro fluid devices that are also used in microsurgery, chemical analysis and medical technology. The **'DESIGN METHODOLOGY FOR MICRO-ENGINEERED FLUID DEVICES'** project successfully adapted silicon chip technologies to produce a new generation of micro fluid devices.

More information:
http://europa.eu.int/comm/research/industrial_technologies/impacts/article_3003_en.html

The project partners knew that the development of 'wafer scale' type technologies for micro fluid devices would allow mass-production, resulting in considerable price reductions. In addition, by integrating mechanical and fluid functions with microelectronics on a single chip, microsystems could be developed to replace conventional fluid systems. Using a modelling system to provide basic designs and help to understand how they worked, three-dimensional micro devices were developed. The partners then used this experience to design five different components and a generic fluid handling system to predict the effect of connecting the devices together. Finally an integrated micro fluid system was produced and tested.

The project had a number of immediate commercial results. Siemens developed a process gas chromatograph (MicroSAMTM) with micro fluidic components, used to measure the relative proportions of various organic components in industrial processes. It has a greatly improved performance over conventional techniques and it is 60% cheaper. A further important outcome of the project was the development of intellectual property – 45 new patents were applied for. The project also led to some important developments in medical technology. Siemens is working on a micro pump combined with a fast heat conductivity sensor for controlling drug dosages, which is being tested on intensive care patients.



Bugging the bugs with a prize-winning detector

Dry crops and animal feed are usually stored in bulk while on their route to market, offering a convenient feast for insect pests that can destroy up to 30% of the crop. The **'PORTABLE EQUIPMENT FOR DETECTION, CLASSIFICATION AND ESTIMATION OF DENSITY OF NOXIOUS PESTS IN STORED PRODUCTS'** project developed sensitive portable equipment to detect these insects on site.

More information:
http://europa.eu.int/comm/research/industrial_technologies/impacts/article_3574_en.html

To avoid the chemical treatment or laborious sampling previously used to protect stored crops, the project partners aimed to develop portable equipment, weighing less than 10 kg, for quick on-site analysis of dry food at stocking sites and to monitor the quality of suppliers' products. After an analysis of user needs, the partners developed an acoustic sensor with an antenna to classify the acoustic properties of the different grains and seeds at various sites. X-rays were then employed to identify the types of insect present and their stage of maturity. The next stages were the development of a software package for detecting, classifying and estimating the density of the insects, building a mock-up of the analyser integrating the sensor and the software programme and field-testing the equipment.

The patented detector won the first prize for co-operative research between SMEs at the fourth SME Technology Day in Leeds in 2002 and a joint venture has been formed to commercialise the technology, now named Early Warning Diagnosis. The potential for this equipment is enormous. At present there are over 1 500 grain stocking organisations in Europe alone, all of which spend considerable sums on insect control. Beyond this is the world market where up to €1 billion is spent each year on insect control for barley alone.

Magnetic performance for better mobile telephones

Magnetron sputtering is a vacuum technology for depositing electrically insulating thin-films of metal oxides, such as silicon dioxide, that can protect electronic devices from electromagnetic interference. The **REOXCOAT** project overcame technical hurdles to scale-up the magnetron sputtering technique with excellent commercial results in six new factories situated in Europe and around the world.

Rising mobile phone use is paralleled by a growing public awareness of the possible health hazards which in turn raises demand for improved electromagnetic shielding solutions. But bulk ceramic shields were too expensive and the coating industry considered that scaling-up magnetron sputtering systems to achieve economic coatings with 'difficult' materials such as aluminium oxide could not be done. The Reoxcoat project proved them wrong. The consortium refurbished a disused magnetron system and adapted it to produce large-scale high-quality coatings, including electromagnetic interference shielding coatings for mobile phones. This breakthrough allowed significant cost savings for an electromagnetic barrier coating, bringing multiple benefits to mobile phone manufacturers and allowing much stricter safety limits for mobile telephone safety standards, thus reducing consumers' exposure to electromagnetic radiation.
The project leader Surfcoat (now part of Savcor) was formed just before the project

began. It is now a large company with 600 employees spread over six factories in Finland, Brazil, USA, China and Hungary, and with a turnover in excess of €45 million. This growth has clearly added to European expertise in this critical field of technology. The technologies developed in the project have made the company a major supplier to Nokia and other mobile phone manufacturers.

INDUSTRIAL RESEARCH BRIEFING

Events

Austrian Presidency conference on European Technology Platforms

4-5 May, Vienna, Austria. More information: http://www.eu2006.at/en/index.html

The European Materials Research Society (E-MRS) Spring 2006 meeting

29 May to 2 June, Acropolis Congress Centre, Nice, France. More information: http://www-emrs.c-strasbourg.fr/

2nd International Conference on Multi-material Micro Manufacture (4M2006)

20-22 September, Grenoble, France. More information: http://www.4m-net.org/Conference

NANOMAT 2006: International workshop on nanostructured materials

21-23 June, Antalya, Turkey. More information: http://www.metucenter.metu.edu.tr/nano2006/

International conference on Nano-science and Technology (ICN+T 2006)

30 July to 4 August, Convention Centre Basel, Basle, Switzerland. Incorporating the STM06 and Nano9 conferences. More information: http://www.icnt2006.ch/

Manufuture 2006 Conference

9-10 October, Tampere Hall, Tampere, Finland. More information: http://www.manufuture.org/

New literature

Intelligent Manufacturing Systems (IMS) impact report

The IMS initiative encourages and supports the formation of international research consortia to address the industrial manufacturing challenges of the 21st century. Industrial and academic partners worldwide cooperate in broad-based technology trials and benchmarking to ensure global compatibility of products and technologies. After ten years of successful operation, the IMS initiative has produced an impact report – History and achievements of phase 1 – that evaluates the initiative's achievements. The report is available from the IMS website: http://www.ims.org/index.html

Report on European Technology Platforms and Joint Technology Initiatives: Fostering Public-Private R&D Partnerships to boost Europe's Industrial Competitiveness

This Commission staff working document, SEC (2005) 800, sets out the preparatory work that has been done on ETPs and JTIs and looks forward to the implementation of Strategic Research Agendas under FP7. The report discusses the structure of Joint Technology Initiatives and how these can involve private-public partnerships to achieve their aims. The document can be downloaded from: ftp://ftp.cordis.lu/pub/technology-platforms/docs/tp_report_council.pdf

Evaluation and Impact Assessment (2001-2003) of completed Brite-Euram and SMT projects – the EVIMP report

DG Research has published the results of an evaluation and impact assessment of over 2000 EU funded RTD projects completed between 1996 and 2001 (covering FP3 and FP4). The study covers industrial research (Brite-Euram and SMT) projects and is based on project assessments carried out by independent experts (including interviews with project participants) followed by qualitative and statistical analysis of the collected data and the experts' scores. At the programme level, obstacles and barriers to success of RTD projects were investigated to help improve the design of future RTD programmes. The study concludes that, while project goals were achieved or exceeded in most cases, for a significant proportion of the projects exploitation of results was a weak point requiring attention. The EVIMP report and project case studies can be found on the Industrial Technologies web page on Europa: http://europa.eu.int/comm/research/industrial_technologies/impacts/list_impacts_en.html

Useful links

Technology Platforms on CORDIS

A new web page on CORDIS gives information and news on European Technology Platforms and reports on progress in establishing them. The web page also gives contact information for each TP and provides links to their websites. The European Technology Platforms web page is at http://www.cordis.europa.eu.int/technology-platforms/home_en.html

Research DG – Sixth Framework Programme

Official site of the Commission Research DG that gives general information on the SixthFramework Programme (FP6). http://europa.eu.int/comm/research/fp6/index_en.cfm?p=0
Additional information can be found through the National Contact Points that provide guidance and practical information on participation in the RTD Framework Programmes.
http://www.cordis.europa.eu.int/fp6/get-support.htm

FP7 on CORDIS

CORDIS provides all the information you need to participate in the Framework Programmes. See http://www.cordis.europa.eu.int/fp7/ to follow progress on FP7.

Priority 3 – Industrial Technologies

For information about FP6 thematic priority3: Nanotechnology and nanosciences, knowledge-based multifunctional materials, and new production processes and devices.
http://europa.eu.int/comm/research/industrial_technologies/index_en.html
http://www.cordis.europa.eu.int/fp6/nmp.htm

Nanotechnology activities in the European Research Area

For more information specifically on nanotechnologies http://www.cordis.europa.eu.int/nanotechnology/

EU-funded steel research

Coal and Steel (RFCS), can be found on the CORDIS coal and steel website http://www.cordis.europa.eu.int/coal-steel-rtd/steel/

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Further information may also be obtained from: **NMP Information Desk: rtd-nmp@cec.eu.int**